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FOUNDED 1872

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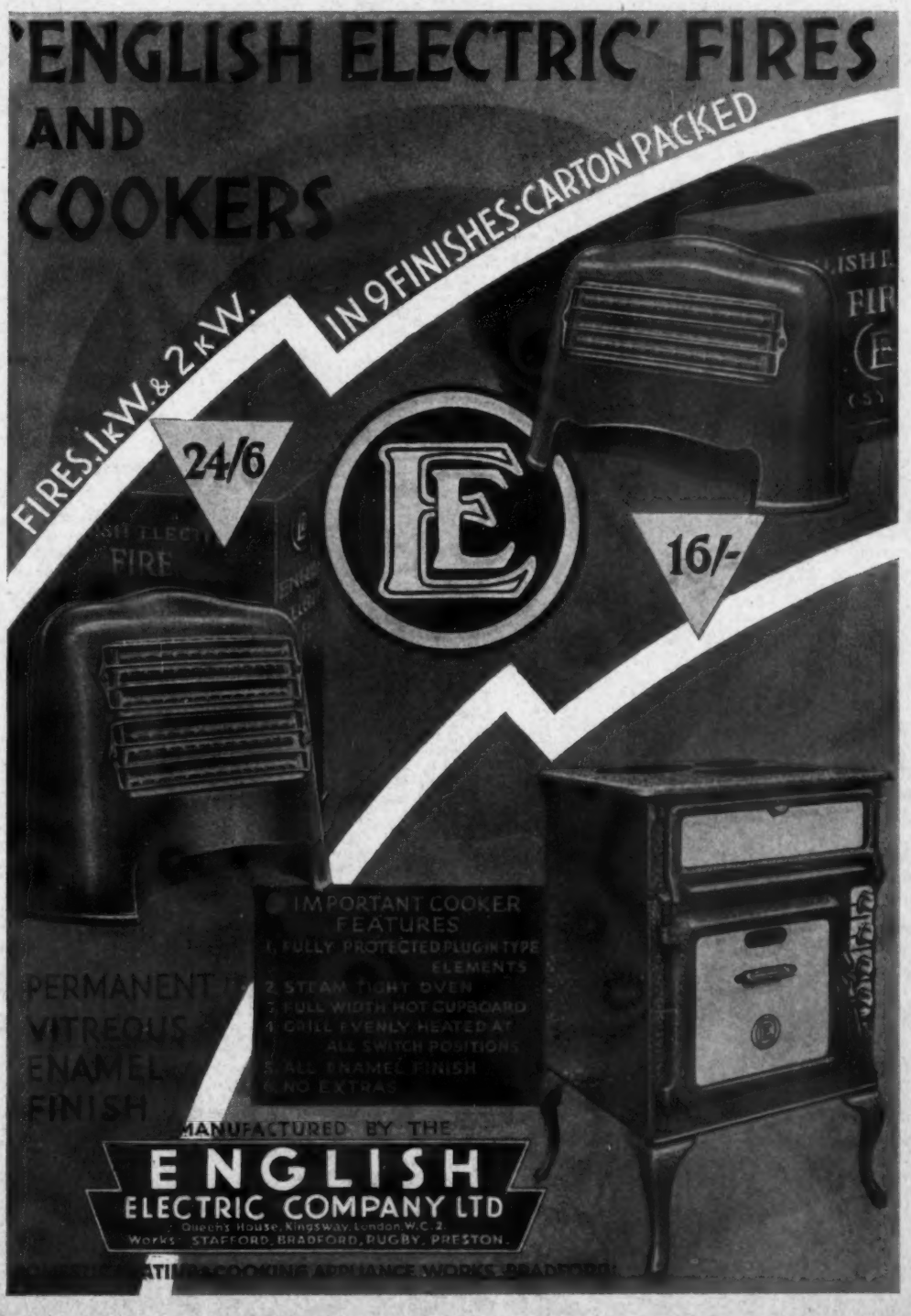
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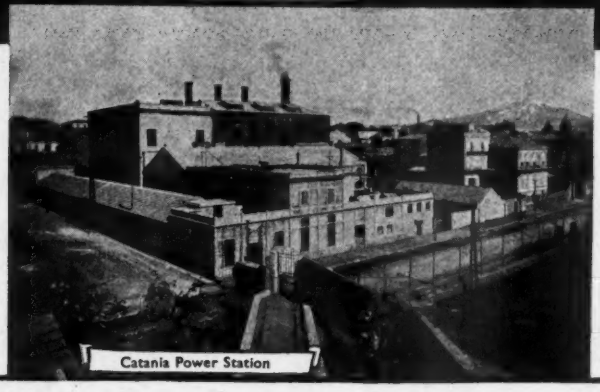
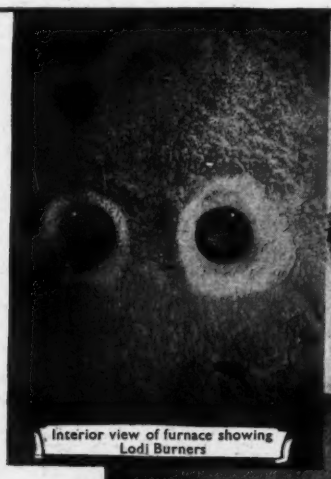


Catania Power Station

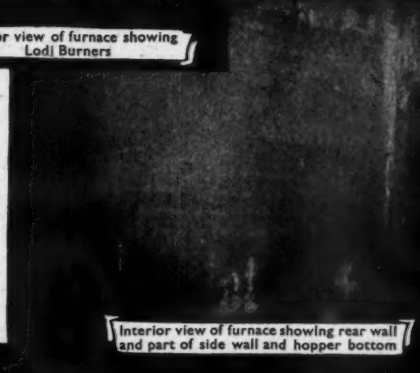
CATANIA
POWER STATION

A steam station, run in conjunction with a hydro electric development, where the first Bailey Furnace on the Continent of Europe was installed.

SOCIETA GENERALE ELETTRICA DELLA SICILIA



Interior view of furnace showing Lodi Burners



Interior view of furnace showing rear wall and part of side wall and hopper bottom

THREE Babcock & Wilcox Boilers were originally installed in this plant, but in 1929 a fourth B. & W. Boiler was installed having a capacity of 110,000 lbs. of steam per hour at 370 lbs. per square inch working pressure and 700°F. final steam temperature. The front wall of the furnace is refractory, the remainder of Bailey construction with hopper bottom. It is fired with pulverised fuel on the Direct System by means of two Lodi Burners and two No. 8 Fuller-Bonnot Mills.

The photographs show the interior of the furnace after 2,348 hours of operation, during which time 7,517 tons of coal were burned under varying conditions of load with an average efficiency of 85 per cent. Over 90 per cent. efficiency has been obtained under test conditions.

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The
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Change Without Decay

THE decision to disband the National Electric Light Association of America possesses particular interest on this side of the Atlantic, because it has been reached while the whole subject of electricity supply association and organisation in Britain is more or less in the melting pot. The operations of the superseded organisation have been regarded with envious eyes by enterprising electricity supply spirits here for many years, because it has been more national and comprehensive than British organisations.

N.E.L.A. is to be disbanded, but only for the purpose of reconstitution. An Edison Electric Institute is to take its place as the national body representing the united electric light and power industry of the States. A New York contemporary states that about 85 per cent. of the financial support of N.E.L.A. is represented by the board of trustees of the new Institute. There will be a "new standard of enforceable ethics and conduct," whatever that may mean, but the Edison Institute will carry on the engineering and sales committee work now undertaken by N.E.L.A., though "possibly in considerably altered form," and co-operative activities with other associations and bodies will "at least partially be maintained."

These details are of American rather than British interest, but the fact of the change (which becomes effective on April 1st) and the admitted necessity for it have a bearing upon our own uncertain position. It is obvious, from other signs as well as this, that American electrical men are facing their problems with an adaptable mind, and the worst thing that can happen to us is to settle down with the idea that what has answered here in the past will answer equally well in the future.

In Britain as we passed from one stage to another we adopted a system of more or less exclusive watertight compartments governed by such considerations as whether ownership and operation were to be in public or private hands. Who is satisfied with the result of this course of action as we observe it to-day?

We formed the Municipal Electrical Association when local authorities were becoming established as electrical undertakers in many parts of the country; there were also many large and small company systems in existence, which went more or less "on their own." Nobody questioned the wisdom of our ways at the time. The Association held successful conventions and in other ways justified its existence for limited purposes. Though there were prophets in the land, none foresaw the course that electrical development would take by the years 1926 and 1933—a course which gives rise in many minds to questionings whether the Association of to-day is suitable for the requirements now facing it, or is so constituted as to be equal to the changes of the approaching year. The stage has been passed when an organisation labelled "municipal" can be expected to hold sway as *the* electricity supply association at a time when other interests have become so large and powerful.

Though the I.M.E.A. has done good work in the encouragement and protection of the municipal ownership idea by fostering the collaboration of the lay member in a specialised technical industry, it would, in our opinion, have been better for electricity supply as a whole had it been possible to foresee the division that it would eventually cause among electrical engineers and managers, who have labelled themselves as municipal, power company, and provincial company groups according to ownership, without any substantial liaison connection.

Here Too?

THE change taking place in America leads us to ask again whether the time is not ripe for a change here as well—a change enabling and encouraging electricity supply men to forsake their separate camps and come into one large more or less uniform force with greater potentiality for enterprising action because united. If this can be done there can be a levelling out of differences and a raising of ambitions all round, with a common policy of full development of all undertakings under the Central

Electricity Board in the interests of electricity supply throughout the entire country. We have argued again and again that there should be a " getting together " of all who represent electricity supply—company and municipal—interests, and we believe that in the mind of the I.M.E.A. itself there is a desire for greater effectiveness. It would be interesting to hear what our readers think about a combination of E.D.A., the I.M.E.A., and company electricity supply bodies, as a means of securing united action for hastening the electrification of the whole of Britain.

Committee D Again

THE slow progress made by Committee D has become a subject of amusement to many members of the electrical industry, but for the unfortunate members of the Committee the situation is anything but amusing. They have agreed among themselves upon a number of drafts of a " fair trading policy " for the industry, but each time one or other of the constituent associations has turned it down " sympathetically " but firmly. The representatives of the various sections who comprise the Committee can hardly be said to be plenipotentiaries. Whatever agreement they arrive at has to be ratified by their associations, who are not in a position to understand properly the views of the others. Is it not about time that these associations put a little faith in those whom they have appointed to the Committee? Then, at last, the latter would be able to produce some kind of working arrangement which could be modified or amended as was found to be desirable after a reasonable trial period. Unless this happens the only alternative to the existing anarchy in the industry is some sort of compulsion, which would be most undesirable.

The Reheat Cycle

THE most immediately noticeable feature of the architecturally pleasing new Dunston power station is the excellence of its lighting, both natural and artificial. Adequate lighting is, strangely enough, a comparatively new development in station design. Technically the most important feature of the plant is the adoption by Messrs. Merz & McLellan of the reheat cycle—a welcome indication that the principle has been justified by experience at North Tees. The latter was the first station in the world at which the system was employed, and it has been followed in many stations abroad where the steam pressure exceeds 600 lb. per sq. in. In addition to securing greater heat economy, we should expect interstage reheating to lower maintenance costs and increase reliability with h.p. steam installation owing to the reduction of moisture during the later stages of expansion.

System Control

AN essential part of any scheme for interconnected running is centralised control. The new control room of the North-Eastern Electric Supply Co. may be taken as a model difficult to improve upon. For supervising the operation of a h.v. network covering 5,600 sq. miles, with over a thousand transforming points supplying 210,000 consumers, including 200 collieries and 100 shipyards and engineering works, the diagram is necessarily elaborate. But the impression we received during a recent visit to the Carliol House control room (which has evolved from what we believe to have been the first in the world, that used at Neptune Bank in 1901) was that its operation would be as easy, even in the most severe emergency, as that of a power station switchboard in the old days. Elaboration and fine detail need not, in electrical working, involve undue complication if enough thought is put into the design.

Electrical Cinema Films

WE are frequently asked to give correspondents particulars of cinema films that have been produced by electrical manufacturing companies, by general engineering firms, and by electrical associations. The value of the film as a means for showing general engineering processes and methods of electrical production, and for popularising the ever-increasing applications of electricity for domestic and power purposes, is already amply proved, but it is important that lecturers and others should know to whom to apply for the available material and facilities. We therefore invite all who have produced films of the classes indicated to send particulars addressed to the Editors of the ELECTRICAL REVIEW. Particulars of the general conditions under which they are lent are also required.

Not a Busybody but——

WE learn that there is a certain amount of excitement among what we have come to call the " smaller undertakings " regarding what is likely to happen to them. We are not aware that those that are giving, or are prepared to give, a good account of themselves have any occasion for anxiety, for is not " the glory of a good man the testimony of a good conscience "? In a recent speech Sir Andrew Duncan said that the Central Board wished to be regarded as a partner in a mutually beneficial scheme, and not as a busybody interfering with the industry or with anybody's undertaking. We have no desire to be unduly critical, and we agree that the attitude of the Board should not be that of a " busybody," but, all said and done, if a local authority does not do its full duty and carry out its obligations it must be prepared for something to happen. Engineers who are eager to make progress but are handicapped by local circumstances have our sympathy.

Refrigerator Trade

JUDGING from the advertisements that are appearing in the daily Press for sales agents and inspectors for individual refrigeration manufacturers, noteworthy efforts are being made to secure advance in this branch of the electrical trade just now. At the same time the grouped operations are proceeding across the Atlantic, where the American Electric Refrigeration Bureau, whose activities have been referred to here on several occasions, announces its intention to carry on during 1933 with plans similar to those adopted in 1931 and 1932. The number of local bureaux is to be increased and where they are already at work local co-operation is to be strengthened. The staff of " field men " for helping to make local contacts is to be increased and plans for extensive advertising in trade journals have been prepared.

Co-operation in Research

ALTHOUGH the Royal Society Mond Laboratory described in this issue is intended primarily for investigations into pure science without regard to commercial applications, the development of industry to-day is, as Mr. Baldwin pointed out, and as many leading electrical engineers have emphasised, becoming more and more dependent on the application of new ideas and discoveries in pure science. The Department of Scientific and Industrial Research is to be congratulated on its foresight in providing the financial aid which enabled Dr. Kapitza to pursue his new line of investigations. These led to the Royal Society providing the new laboratory primarily for the investigation of the properties of matter in very intense magnetic fields—work which will find its commercial application later.

A Sailor's Yarn

IN peace-time vessels of our Merchant Service do not carry marines, but they sometimes number special correspondents among their passengers. It was one of these who was told, and who repeated the statement in a Sunday paper, that the *Empress of Britain* is " actually the sixth largest power station in the world, and on full output can generate 3,200 kilowatts." It was a shame for the " electrical engineer officers," who were his authority, to pull their eminent passenger's leg, but surely national newspapers can afford to employ somebody with knowledge to check such extraordinary statements. Or don't they want them checked?

Dunston Power Station

The first section of the new 50-cycle installation

THE change of frequency on the North-East Coast from 40 to 50 cycles presented an opportunity to review the whole problem of power requirements for the area of 5,620 sq. miles supplied by the North-Eastern Electric Supply Co., and for export *via* the national grid. It was decided to erect a new 50-cycle station (adjoining the old 40-cycle station) at Dunston with an ultimate capacity of 300,000 kW.

The first section of the station, 150,000 kW, has now been put into commission, and during the past few days we have enjoyed the opportunity of seeing over it.

The site of seventy-five acres has a quarter-mile frontage on the River Tyne; on the other side are the lines of the L. and N.E.R. Co. The area south of the latter is reserved for an emergency coal store of 160,000 tons capacity to a depth of eight feet. The foundations of the station (for which, with all civil engineering work, Sir Robert McAlpine & Sons were responsible) consist of a raft built on 5,500 reinforced-concrete piles, 14 in. square and 40 to 45 ft. long, which were made on the spot. The main buildings are of steel frame construction, and the boiler houses are at right angles to the turbine house (to the north of it) towards the river. The switch house and offices are on its south side.

The Turbine House

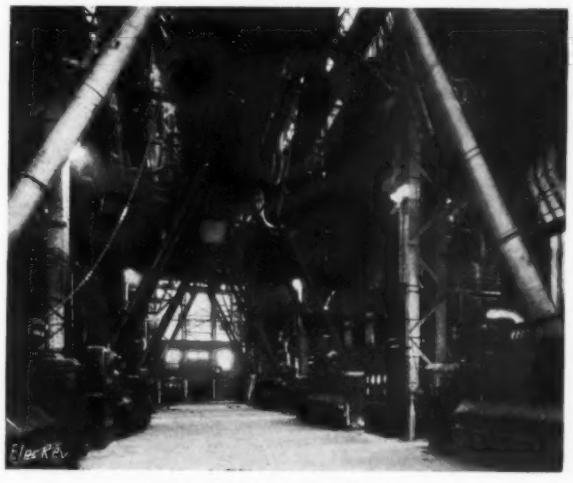
There are now three 50,000-kW (m.c.r.) 1,500-r.p.m. Parsons turbo-alternators arranged longitudinally and space for a fourth. The turbines are of the two-cylinder tandem-reaction type with single-exhaust l.p. cylinders. Steam conditions at the stop-valve are 600 lb. per sq. in. and 800 deg. F. The heat consumption curve is nearly flat from half to full load. Steam from the exhaust of the h.p. cylinder is taken at 115 lb. per sq. in. (gauge) to reheaters and is returned to the l.p. turbine at 800 deg. F. Three-stage bleeding has been adopted for feed-water heating, up to a temperature of 340 deg. F. at the h.p. heater outlet at the most economical rating. Bled steam is also used for evaporating make-up water.

To reduce the torque on the motor-operated turning gear for starting the turbines, a separate oil system (1,500 lb. per sq. in.) lifts the shaft journals off the bearings. The h.p. steam chest contains an emergency trip valve and three oil-operated governor valves, which open successively as the load increases, and the l.p. turbine is provided with two valves, one on each side, which control the steam from the reheaters; without these the steam stored would cause the set to run up to tripping speed if the load were thrown off.

The 13.5-kV alternators are designed to deliver their full output at 0.8 p.f. Each alternator with its 160-kW, 440-V exciter, two fan motors, and s.r. brush gear is totally enclosed and ventilated on the closed-circuit system, with an oil cooler in the foundation block. One fan only is in use up to the most economical load of 40,000 kW at 0.7 p.f. The stator casing is of welded steel and the rotor is a solid forging. Main field variation is effected by exciter-field rheostats only; these are motor driven and controlled by Metropolitan-Vickers automatic voltage regulators. Cranes (supplied by Joseph Booth & Bros.) with a capacity of 25 and 120 tons are installed in the turbine house, and one of 12 tons in the auxiliary annexe bay.

Condensing Plant

The three-flow surface condensers (by Richardsons, Westgarth & Co.) are designed to maintain a vacuum of 29 in. Hg. when supplied with 26,500 gal. per min. of condensing water. When one-half of the cupro-nickel condenser tubes are being cleaned, the turbine can be operated at reduced load. Two steam air ejectors are provided for each condenser; one uses condensate and the other (normally stand-by) uses circulating water as cooling media. There are also two extractor pumps to deal with a little more than half the full-load condensate each.



Interior of the boiler house

Circulating water is obtained from three vertical-spindle Drysdale pumps (flooded at all tides), each capable of delivering 1,860,000 gal. per min. against a 47-ft. head, which can be controlled locally or from the turbine house. The pumps are housed in a reinforced-concrete building on the bank of the river. There are two 64-in. inlet mains and one 72-in. outlet main discharging downstream. Full use is made of a syphoning effect. Three vertical rotating-band central-flow Brackett screens, each capable of dealing with 2,000,000 gal. per hr. at lowest water level discharge into the pump suction chamber.

In addition to the unit evaporators supplied with bled steam, there is a Richardsons-Westgarth evaporating plant with an output of 50,000 lb. of distilled water per hr. Its steam supply is reduced from boiler pressure and temperature to 250 lb. per sq. in. and 440 deg. F. The feed make up is taken from the town mains, and its hardness is reduced to 4 deg. in a Kennicott softener before being delivered to the evaporators.

An exterior view showing the ash-handling plant

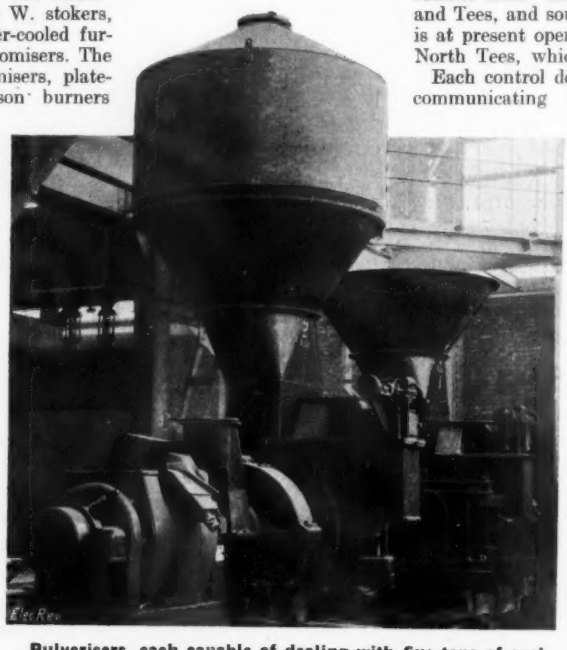
D

There are four motor-driven and two steam-driven Weir feed pumps. Two of the former and both the latter have individual duties of 480,000 lb. per hr. against a head of 850 lb. per sq. in. The other two motor pumps are of half the capacity. The curves have a continuously falling characteristic from zero to maximum loading to ensure parallel operation at all loads without hunting.

The Boiler House

Ultimately there will be three boiler houses, each containing four boiler units and four reheater units, set in two lines, at right angles to the turbine house. One complete stoker-fired boiler house and one line of pulverised fuel boilers have been built; the reheater units are nearest the turbine house. All units are of the Babcock-Wilcox type.

The main boilers, built by Clarke Chapman & Co., have each a maximum capacity of 156,000 lb. of steam per hr. at 625 lb. per sq. in. and 825 deg. F. The reheater units, made by Babcock & Wilcox, produce 125,000 lb. of steam per hr. under the same conditions and also reheat 180,000 lb. of steam per hr. from 520 to 825 deg. F. The stoker-fired units are fitted with B. & W. stokers, tubular air heaters, Bailey water-cooled furnaces, and Foster gilled-tube economisers. The p.f. units have B & W. economisers, plate-type air heaters; and Woodeson burners are installed for the main boilers and Calumet burners for the reheaters. Two five-ton "Resolutor" unit-type pulverisers are provided for each of the boilers and reheaters.



Pulverisers, each capable of dealing with five tons of coal per hour. There are eight in all

Two forced-draught and two induced-draught fans per boiler are driven by squirrel-cage motors through variable-speed couplings supplied by the Hydraulic Coupling and Engineering Co. Dust is extracted from the flue gases before reaching the i.d. fans by Davidson collectors of the direct type (three per fan). The dust is drawn from the receivers by high-pressure water ejectors (supplied by the Ash Co.), which also draw dust from other points at which it may collect. Drag link conveyors in water troughs deal with the ash and riddlings from the stokers, and the "Hydrojet" high-pressure water system clears the ashes from the storage hopper under each p.f. unit.

Coal delivered for railway trucks into hoppers below ground level is drawn thence by two gravity bucket conveyors each with a capacity of 75 tons per hr. Special wagons bringing fine coal for pulverising are dealt with by an enclosed tipler made by Strachan & Henshaw. The coal handling plant was supplied by the Birtley Co.

The Cambridge Instrument Co. supplied the electrical thermometers and pyrometers and Electroflo Meters Co. the water meters, draught gauges, CO_2 meters, flow meters, &c. The general pipework was provided by Aiton & Co., the contract including the supply of pumps, air compressor, and tanks. "Corwel" sealed-weld joints are employed for the solid drawn steel h.p. piping. Hopkinson high-pressure valves and Blakeborough water-service valves are used. The three reinforced concrete chimneys are 250 ft. high with an internal diameter of 18 ft. at ground level tapering to 15 ft. There is an annular air space between the shell and the acid resisting brick lining.

Transformers, Switchgear, and Auxiliaries

The 63-kVA 13.5/66-kV Ferranti transformers are of the forced-oil circulation water-cooled type. Alternator switching is performed at 66 kV, and the Reyrolle metal-clad oil-filled switchgear, with a rupturing capacity of 1½ million kVA, is accommodated in two houses, each divided into two sections by fire-isolating barriers. The duplicate busbars are correspondingly divided into two main sections, connected through reactors and sub-divided through isolators. In the event of fire, any section can be flooded with CO_2. The oil-immersed isolators give two-point break, so that connections from both sets of busbars are not brought within the same chamber.

The auxiliary motors associated with each turbo-alternator and its boilers are supplied normally from a unit transformer teed off the alternator terminals. Supplies for starting up and for motors common to all generating units are derived from two 66,000-V transformers or, in emergency, from a 2,500-kW impulse-type turbo-alternator made by Richardsons, Westgarth & Co. From the 3,000-V unit and station switchboards feeders (by British Insulated Cables) are run to local Parsons transformers and distributed at 400 V. All motors are direct started.

System Control

At Dunston is the principal point of connection between the company's system and the grid. The local operating room has a relatively simple lay-out, and forms a contrast to the elaboration of the system control room at Carliol House, Newcastle, 4½ miles away. Here there is a diagram of the entire h.v. network (the various voltages in different colours) and the generators and the 1,000 transforming points. All switchgear and protection is indicated by coloured discs, of which there are 100 different kinds, to a total number of 8,000; the size and other particulars of each main are also shown.

The staff consists of a senior control engineer (working office hours), five control engineers, five sub-control engineers, four assistant control engineers, and three typists. Three engineers are employed per shift, each looking after one of the three control areas—north of the Tyne, between Tyne and Tees, and south of the Tees. The last named is at present operated from a sub-control room at North Tees, which is to be closed shortly.

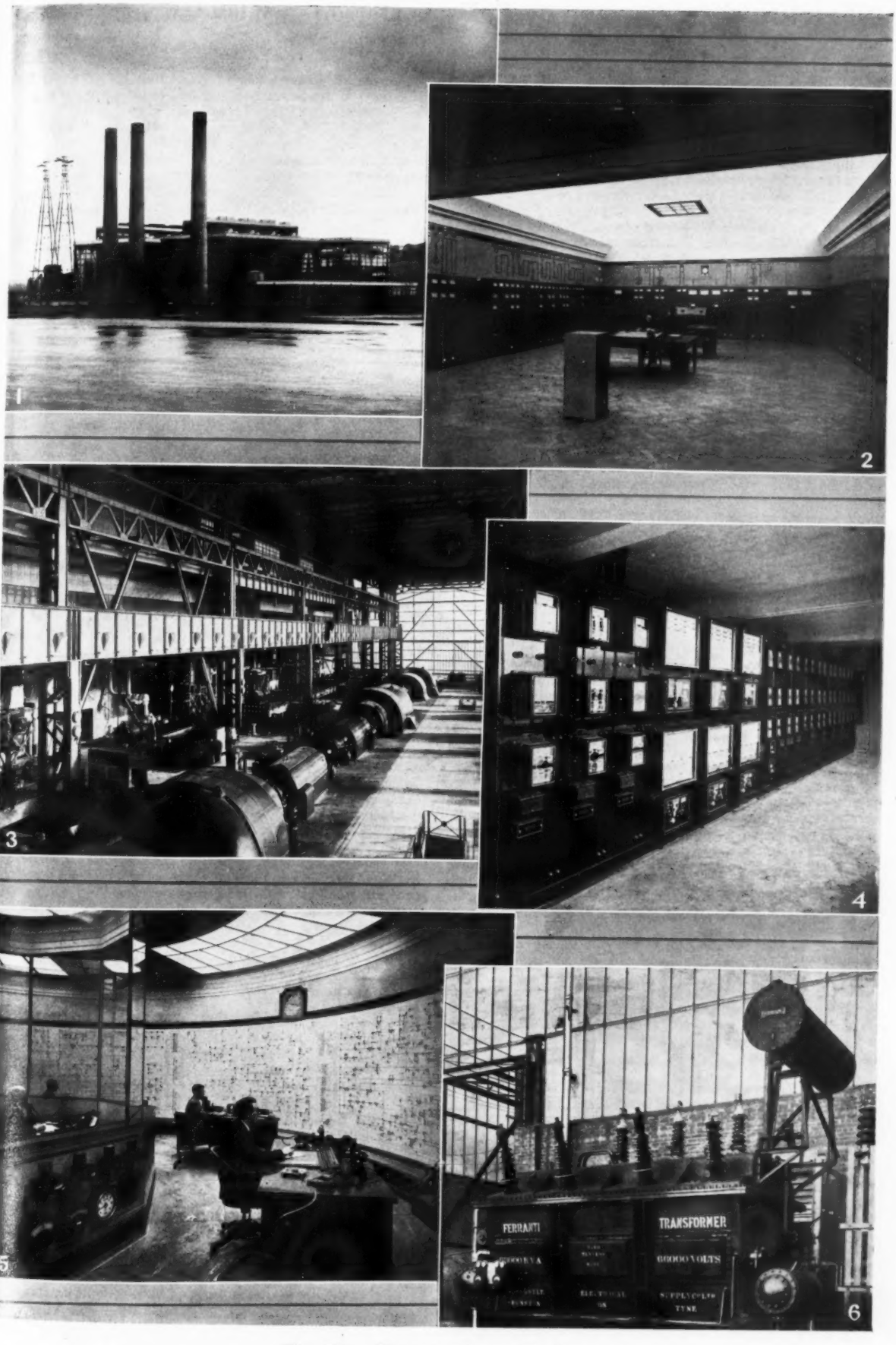
Each control desk is fitted with two telephones communicating with sub-stations and power stations by the company's private system, and also a Post Office instrument. The control engineer authorises all h.v. switching, which he records on the diagram as well as in his log, and sanctions the issue of permit-to-work cards. He is also responsible for voltage regulation at various points on the system, and decides what generating plant shall be run according to a programme which is arranged weekly.

Mr. E. G. Swangren, who, under the direction of Mr. J. Cusworth (chief operation engineer), was responsible for the contruction of the control room, told us that electrical indicator panels are to be erected with instruments indicating the loads at the main power stations, transmission lines, and sub-stations. Mr. H. A. Couves (general manager), at the official luncheon, gave a brief historical summary of the company's work since its inception in 1889. He pointed out how the company had ante-dated the grid idea by closing down twenty stations. The three main stations (Dunston, Carville, and North Tees) had an aggregate capacity of 282,730 kW and waste-heat stations of 70,730 kW. He paid a tribute to Mr. Maxwell Buist, the local representative of the C.E.B., and also to Messrs. Merz and McLellan, who had been responsible for the design and lay-out of the civil engineering, as well as the mechanical and electrical, arrangements at Dunston. A large proportion of the labour and material employed in the erection of the station (to the value of about £1½ million) was of local origin.

Railway Signalling Symbols

There has just been issued a new British Standard Specification (No. 376), Part II, covering Railway Signalling Symbols. Part I was issued in 1930 and covered the schematic symbols used for showing the signalling requirements on plans or diagrams. Part II covers a rather different field, as it includes a list of symbols for use on wiring diagrams, in this connection closely following wherever possible Standard Specification No. 108, Graphical Symbols for Electrical Purposes, and also explains clearly and fully a method of labelling various pieces of apparatus according to the function for which they are used. One type of relay, for instance, may be used for many different purposes, and this new publication shows how, by labelling with one or two letters and figures, the designer, the wireman or the reader of the circuit can readily understand the exact function of the relay shown on the diagram.

The new issue also gives very full notes and explanation of the written circuit system of preparing diagrams, a method which will probably be of considerable interest also to electrical engineers concerned with other apparatus. The labelling of the wires in such a manner that they can be readily identified is also dealt with extensively. Copies of the Specification may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d. post free.



The New Dunston Power Station

1. The station from the north-west 2. The interior of the operating room at Dunston. 3. The turbine house. 4. The main metering panel. 5. The system control room at Carliol House. 6. A 63-kVA 13.5/66-kVA Ferranti transformer

Trickle Charging. By E. R. Sanderson, A.M.Inst.C.E., A.M.I.E.E.

Conditions in which the method is most advantageous

A STORAGE battery gradually discharges itself if left for long on open circuit, due to a combination of external leakage and internal local action on the plates. If this were allowed to continue long enough the specific gravity of the sulphuric acid would gradually fall and the plates would ultimately reach a condition difficult to rectify.

A periodical charge could be given to reduce the sulphate, but the plates would lose their healthy appearance and become of low capacity. To counteract this tendency to "sluggishness" a battery which acted purely as a standby was formerly given deep discharges and recharges in periodic cycles; in many cases this meant providing artificial loading. Although such a battery could be kept "healthy" with a considerable amount of trouble, such treatment was apt to be neglected, since deterioration did not quickly show itself as a warning. Added to this were the gradual wear and tear on the battery and the non-availability of the full capacity on the occasion of "health" discharges.

To remove these drawbacks to the use of standby batteries the "trickle charge" system has been developed within recent years by which a current of a very low value is passed continuously through the battery in the charging direction. The amount of current so passed must be enough to balance, hour by hour, the amount which otherwise would be lost on open circuit; with a very small amount of care this balance can be so adjusted that there is no current wasted in electrolysis of the water in the electrolyte (gassing), nor is there any diminution of the capacity of the battery, day after day.

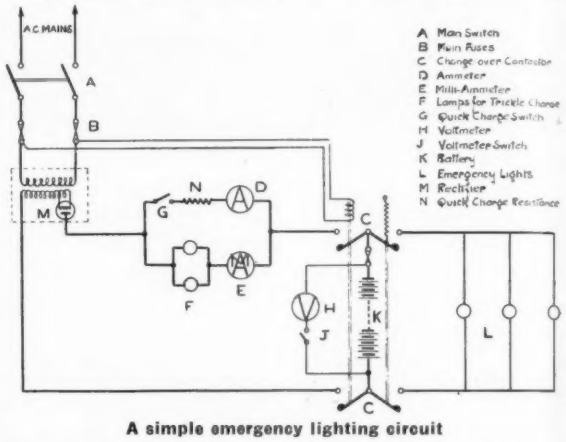
Many standby batteries have been operated on this system for several years past. These batteries are in perfect health and are virtually as good as new, and there seems no doubt that they will have very long lives. Correct operation is simple, provided the essential conditions are grasped.

Practically no deposit is thrown down from the plates after years of working in this way. The attention for topping up with water is negligible, many batteries needing this only about once a year. Periodical cycles of discharge and recharge are unnecessary for the health of the plates; hence whenever the demand comes the battery is ready, and has its full capacity available.

Emergency Lighting

As a general rule, the battery should be isolated from all but the trickle-charge circuit, and an automatic switch should be provided to bring the battery into use if hand switching is not quick enough. In addition, means for giving a higher rate of charge are necessary (except in the case of a small portable battery which can be removed after use for charging up fully). This combination is the subject of British Patent No. 313248, which covers a variety of circuits for the same general object. The differences between one circuit and another lie in the details which, in turn, depend on such questions as the type of supply from the mains, the size of the load, the exact method of handling the load, and the different types of charging apparatus, made necessary by varying economic factors.

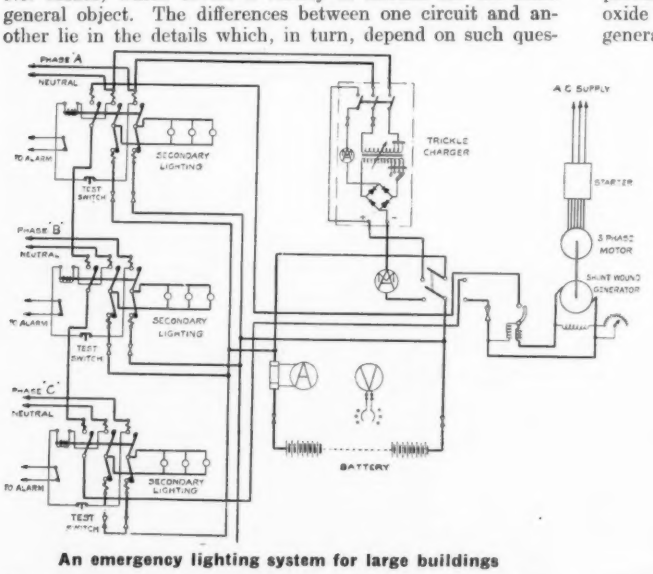
One of the important applications of trickle charging is in connection with batteries for emergency lighting in hospitals, cinemas, hotels, banks, stores, factories and so on. The requirements vary enormously; for hospitals the only requirement may be the lighting of four or five emergency lamps in the operating suite. In such a case a simple circuit is sufficient, with the addition of a special relay, if necessary, in connection with the actual operating table lamp. Simple 25-V or 50-V wiring is used for the emergency lamps which are illuminated only on failure of the normal lighting. The battery is continuously trickle charged through a rectifier, or through a high resistance if the mains are d.c. From the same source a higher rate of charge can be switched on to replace any emergency discharge.



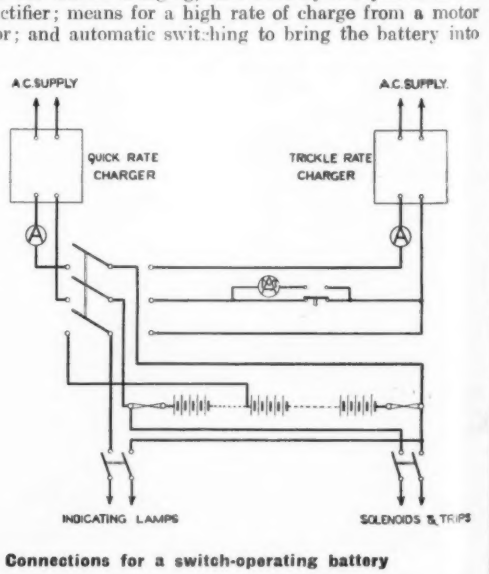
A simple emergency lighting circuit

In cinemas the secondary lighting points are generally supplied continuously throughout the performance, normally direct from the mains, but are automatically switched on to a battery on failure of the mains. The lighting need not be at the same voltage as that of the mains, since a transformer or motor generator can step down the mains voltage, thus allowing a low-voltage system and battery to be used.

For large buildings a much more complicated system is sometimes necessary, involving a number of different lighting circuits, such as that illustrated diagrammatically (fig. 2) relating to an equipment just being installed in an important civic building in Yorkshire. A somewhat similar equipment has already been installed in a large store in the same town, the battery consisting of 116 cells of nearly 1,000 Ah capacity. The complication lies in the detail, the three essential features being the same as in the arrangement previously illustrated; provision for trickle charging, this time by a separate metal oxide rectifier; means for a high rate of charge from a motor generator; and automatic switching to bring the battery into action when necessary. Many important buildings have now been equipped with emergency batteries controlled on these general lines in London and the provinces.



An emergency lighting system for large buildings

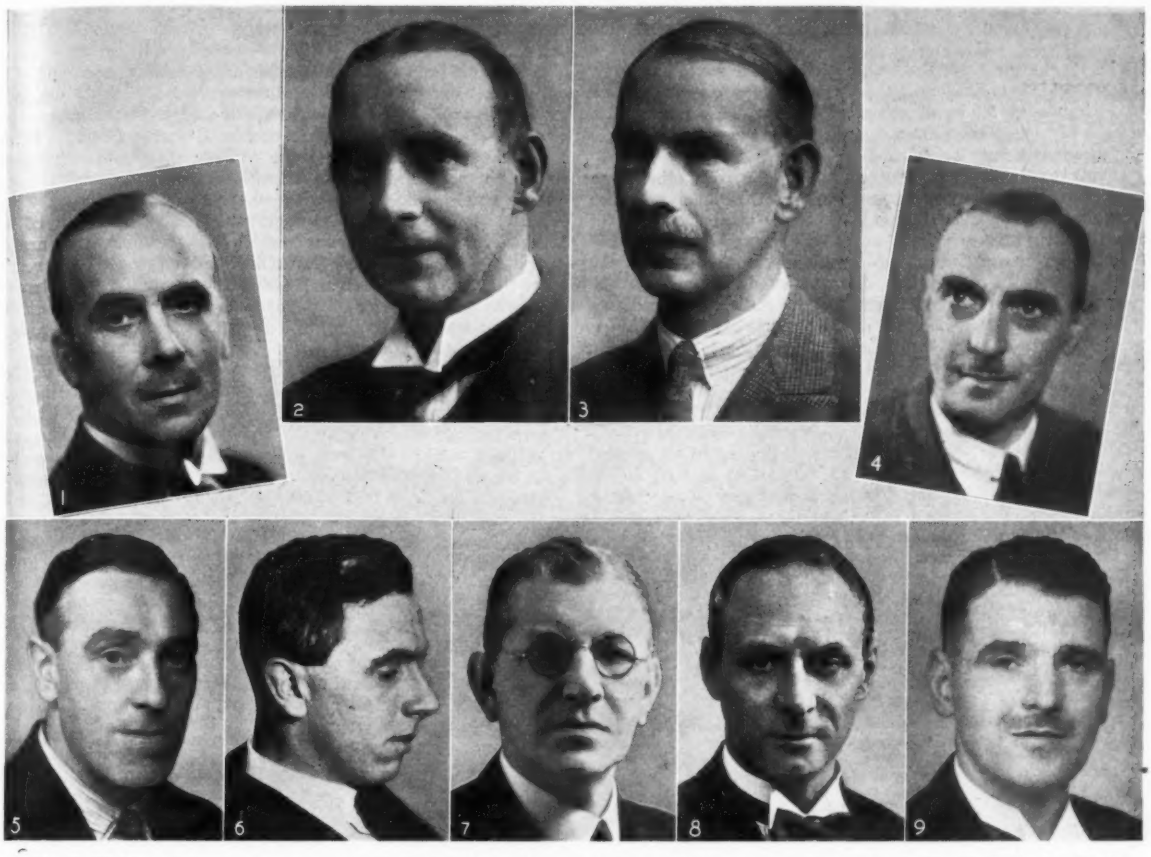


Connections for a switch-operating battery

Switching Batteries

The trickle charging system is coming into use in connection with high-voltage switch closing and tripping. Incidentally,

Some Driving Forces in the Industry: Premier Electric Heaters, Ltd.



1. Mr. E. Walden, Sales Dept. 2 & 3. Mr. H. F. Collins and Mr. G. Collins, joint managing directors. 4. Mr. H. T. Taylor, Technical Dept. 5. Mr. C. H. Hands, works chemist. 6. Mr. G. Moore, Export Dept. 7. Mr. C. Pitcher, London representative. 8. Mr. H. D. Edge, works cost accountant. 9. Mr. H. Burke, Production Dept.

Trickle Charging (*continued from opposite page*)

some greater degree of voltage standardisation is desirable; for switch closing 110 V is commonly in use. There are still far too many stations and sub-stations with batteries charged periodically by a generator through the old house-lighting-type of battery panel with automatic cut-in and cut-out and end-cell switches.

A much better system is available to-day. To incorporate it to the best advantage the auxiliary circuits about the h.v. switchboard should be designed with such a system in view. Two important facts are by no means universally recognised. In general, switching solenoids take a heavy current and negligible Ah, while indicating lamps take a small current but far more energy per day than the solenoids. For this reason the mains, directly or indirectly, should supply the small continuous load and the battery only the heavy switching peaks, plus indicating lamps during a shut down. The energy taken out of a battery by switching solenoids is, usually, far less per day than that lost on open circuit during the same period.

Open-circuit losses rarely exceed 2 per cent. of the ten-hour rate capacity per day, *i.e.*, in a 100-Ah battery the loss would not exceed 2 Ah in twenty-four hours. Assuming this battery had to operate solenoids twenty times daily, each operation taking 100 A for one second, the daily consumption would be about 0.55 Ah or a quarter of the open circuit loss. To replace this small discharge the increase in the trickle charge current might be only from 80 mA to 100 mA. The indicating lamp load might easily be 2 A, *i.e.*, a hundred times the continuous discharge represented by switching peaks.

The Effect of Continuous Loading

The best method of dealing with a battery for this type of load depends almost entirely on the nature of the continuous loading, if any. For instance, there may be nothing but indicating lamps to be supplied, the load being constant. On the other hand there may be mimic busbars or other signalling systems which may vary hourly in consumption or may require d.c. In general it is best to run two separate auxiliary busbars along the main switchboard, one for momentary currents, *i.e.*, switching and tripping, and the other for signalling services. The latter, provided d.c. is not essential, can best be fed directly from the a.c. supply, stepping down through a small transformer if necessary.

An automatic switch in this circuit would immediately change the load over to the battery on the shut down of the a.c. supply, reverting to the latter when normal conditions had been resumed; in these circumstances trickle charging can be carried out with exactitude. Another method is that illustrated, which allows the rectifier to give as d.c. output the sum of the trickle charging current and indicating lamp load. A milliammeter enables the trickle charge current to be read momentarily, but a spring-closed switch or push-button normally short-circuits the instrument when the battery is called upon to carry the indicating lamp load. This circuit, incidentally, requires care in design, and finely graduated adjustment of the rectifier output is necessary. Means are also required for a high rate of charge, although this will rarely be needed; this can take the form of a larger rectifier or a motor generator.

Occasionally, the indicating lamps can be switched off during the rare occasions of a quick charge, leaving all the rectifier output available for charging, and thus rendering a second charging source unnecessary; as a rule, this is only possible with the smaller batteries used for tripping and indicating only. If indicating lamps or signals are left connected to the battery during the high rate of charge they must withstand temporarily a voltage 20 per cent. above normal (normal voltage during trickle charging being about 2.25 to 2.3 V per cell) and should, therefore, normally be under-run. Alternatively, they may be connected to fewer cells during such charging. If the indicating lamp and signal load should be subject to considerable variations the rectifier should, if possible, give a constant output voltage independently of the load changes.

The trickle charge system is applicable to a lead-acid storage battery on any duty where the discharges in Ah are negligible, or where discharges are required only rarely, and reduces the cost of battery maintenance. As with most developments, common acceptance of the " trickle charge " system has been slow, but there is now a growing tide of opinion in its favour.

Cable Charging. By F. G. W. Tree, Assoc.I.E.E.

A simple exposition of the underlying principles

THE charging transient which follows the switching in of a cable is oscillatory if the circuit resistance is below, and impulsive if above, a critical value. This transient is usually of higher value than the permament charging current, but disappears very quickly.

Owing to the high resistance of the dielectrics, the time required for the charge to penetrate is much longer than the duration of the external transient. Since at the moment of applying the pressure there can be no charge on the dielectrics no electrostatic flux can terminate in them. All the lines of flux must, therefore, pass from end to end of the cable, and finish at the terminals. The initial voltage distribution between the dielectrics will be such as to provide a uniform flux density throughout the entire length of the cable in inverse proportion to their specific capacities. If the resistance of the dielectrics were infinite no further charge would take place. In practice, dielectrics possess conductivity and varying value of specific capacities and resistances.

There will be a current flow, and a difference of current density between the dielectrics, and an electrostatic charge will build up between them. This charge lowers the voltage gradient, and equals the difference in current density between the dielectrics and the rate of formation of the internal charge. At this point, with an alternating voltage impressed on dielectrics of finite conductivity, the charging current does not lead the applied voltage by exactly 90 degrees; there is a minute current component representing the current passing through the dielectrics, and also the dielectric losses due to the alternating field, which are larger at high temperatures where resinous impregnated dielectrics are used.

Mr. F. G. W. Tree is a member of the staff of the Glasgow Corporation Electricity Department

The Soaking-in Process

The current remaining after the initial transient has ceased gradually decreases to a final minimum value. The "soaking-in" current consists of that due to applied voltage through the dielectric resistances, and a transient supplying the internal charges over them. The first component is dissipated in heat. The slow transient causes a change from the initial voltage distribution due to capacity to the final voltage distribution due to the resistances of the dielectrics. There is also a change from uniform flux density and ununiform current density to ununiform flux density and uniform current density.

The energy electrostatically stored in the cable increases during the slow transient of the internal charge by half of the transient component. Thus, the energy stored in the cable will reach a maximum at the end of the slow transient, when the current due to the applied initial voltage will be at a minimum. The stored energy and the capacity are at a minimum at the commencement of the initial charge. A cable having composite dielectrics differs from one with uniform dielectrics in that in the latter the energy is stored in the metallic components, while in the former the energy is stored in the dielectrics also, as an electrostatic charge; this energy can be discharged from the dielectrics, but, owing to their high resistance, the process is slow.

The conduction a.c. passing into the dielectrics is not the same as the final value of d.c. conduction current. It is usually much larger, and is the transient value of the conduction current, *i.e.*, the initial value of the slow transient. Under alternating voltage condition the watts loss is, therefore, much larger than when direct current is applied. Hence, assuming that there are no other losses, the energy component will be much larger than the conduction current of continuous voltage; the dielectric resistance will be much lower than the resistance with d.c.

A True Ohmic Effect

The alternating energy current, and the resistance calculated from it, represent the results of a true ohmic effect. They are independent of frequency, and are often misunderstood as being the result of hysteresis. Briefly, they represent the resistance effects of the medium between the internal charges and the external circuit. Of course, these losses must be coupled to those due to ionisation, and probably also to those which may be due to some form of hysteresis.

The dielectric strength ratio (*i.e.*, the ratio of the direct disruptive voltage to the crest value of the alternating voltage) is directly linked with all problems of cable charge and discharge. When air forms the dielectric the striking distance of a d.c. voltage is equal to that of a.c., but cable dielectrics withstand materially higher d.c. than a.c. voltages. With constant internal voltage, the voltage distribution between two component dielectrics changes between the initial and final conditions.

If the first dielectric is operated closer to the limit of its strength than the second one, and the terminal pressure is applied quickly, at a certain terminal voltage it will reach its disruptive gradient and the insulation will be punctured. If the voltage is applied slowly, the final voltage gradient for the same terminal voltage in the first dielectric is lower, and the disruptive gradient in the first dielectric can be reached only by a higher terminal voltage. In the former case, the dielectric passes through the initial stage of voltage distribution when it is overstressed. In the latter case, while still below puncture pressure, it passes this stage at a lower terminal voltage, and by the time higher voltages have been reached is relieved by the readjustment of voltage, causing a higher gradient on the second dielectric. If the second dielectric be the weaker, the dielectric may have a much higher puncture voltage, with a rapidly increasing terminal voltage, than with a slowly increasing voltage.

This time lag of breakdown is not a temperature effect, but is due to resistance. This is on the assumption that the relationship between the breakdown and the breakdown gradient is instantaneous, and that the breakdown occurs as soon as the breakdown gradient is reached.

Discharging Cables

If we short-circuit a composite cable of two dielectrics which has been charged to a constant terminal voltage, and has reached the stationary conditions of voltage distribution and internal charges, it quickly discharges. In the first moment the internal charges at the boundaries of the two dielectrics remain the same. They now discharge their energy towards the cable terminals (through the high resistance of the dielectric) in the form of a slow transient, and the current gradually falls to zero. Suppose, now, that the cable is left fully charged on open circuit. Charges, terminal voltage, and internal voltages will gradually decrease and die out.

There now remains one other form of discharge, and this is perhaps the most important. Assume the cable to be short-circuited for a very brief period, sufficient to pass the external transient and cause the terminal voltage and charges to drop to zero. Before there has been any appreciable discharge the short-circuit is cleared. By the withdrawal of the terminal charges the internal charges at the boundaries of the dielectrics are set free and their corresponding voltages become manifest. The voltage gradients thereby cause currents to pass through the dielectrics and decrease the internal charges. Furthermore, these slow transients build up external charges, and these appear as a terminal voltage. A transient voltage is built up to a maximum, gradually decreases to a minimum, and then dies down to zero. Half of the energy of the internal charges is stored as the terminal charge, while the other half is dissipated in the resistance of the dielectrics, *i.e.*, by conducting the charges through the dielectrics.

By deduction, we find that, if the energy stored by the internal charge is half that of the terminal voltage, the residual terminal charge would contain half the voltage of the initial terminal charges. The magnitude of the resultant residual terminal voltage may be very considerable, and very large discharges may take place. It is obviously not sufficient merely to flash a cable to earth, on the assumption that the cable will then be immediately and absolutely "dead."

Difficult Transportation

A stator weighing fifty-one tons, constructed by the General Electric Co., Ltd., for installation at the L.M.S. Railway generating station at Stonebridge Park, was successfully transported by rail from Witton to Stonebridge Park last week-end. Owing to the dimensions of the stator, which has an extreme width of 10 ft. 5½ in., the opposite tracks had to be kept clear of other traffic during part of the journey from Witton, which was made by special train.

New Showrooms at Ipswich

THE new showrooms of the Ipswich Corporation Electricity Department, which were inaugurated by the Mayor (Ald. R. F. Jackson) on February 2nd, are in Lloyd's Avenue, where premises were purchased by the Corporation in 1931. An addition has been made to these premises containing a basement and three floors. The first floor of the original building is held on short agreement by the Inland Revenue Department, and when this agreement expires it is anticipated that there will be competition for the office accommodation so released among the many wholesale electrical firms for whom Ipswich is the centre for East Anglia. In this original building the second and third floors, a portion of the basement, and one show window are already occupied by the General Electric Co., Ltd., exclusively for wholesale purposes.

Half of the ground floor is used as Installation Department offices, and a large workshop is already in use in the well-lighted basement.

The remaining half of this floor is laid out as a showroom. Oak fittings serve for display and service, whilst an oak counter and grille partition off the section for the Accounts Department, and another section for the canvassers, who are, therefore, at all times in close touch with consumers visiting the showroom.

The basement of the new portion of the building consists of a sub-station serving to indicate to industrial consumers the type of apparatus it would be necessary to install in their premises, with l.p. switchboard, metering equipment, and distribution boards, as well as a well-planned and convenient stores. The ground floor is, primarily, laid out as a large entrance hall, in which are tastefully displayed, without congestion, various types of radiators, floor standards, etc., and this communicates with the large showroom by means of an artistic archway attractively illuminated with lay-lights, the floor consisting of patterned terrazzo.

The first floor of the new building is a showroom, measuring 60ft. by 20ft.; it is not fully occupied at present, but it is intended to provide facilities for the exhibition, by means of temporary partitions, of the service which electricity can afford to a modern house or flat, or any other special feature. The second floor, of the same size, is entirely devoted to domestic appliances, such as cookers, washing machines, irons, refrigerators, etc., and is fitted with a platform and every convenience for cooking demonstrations, with sixty tip-up seats. An "all-electric" kitchen is also provided.

Externally, every possible advantage is taken of the building and the convenience of the site for advertisement purposes. Most types of signs are displayed, while a special feature is the floodlighting, which is arranged on attractive brackets so that the projectors are hidden by an arrangement of oak leaves, and from these brackets are suspended acorn-shaped amber lights.

The centre panel in the space between the first and second floors is occupied by a synchronous electric clock having a centre seconds hand, while in the centre of the parapet is an appropriate design incorporating the monogram of the Department, and the words "Light, Power, and Heat" on a ribbon, which is also separately floodlighted. Sections of the parapet are also of glass, instead of stone, and illuminated from within by various colours. Goods and passenger lifts have been installed.

The whole of the electrical work in the new showrooms has been carried out by the Corporation's own Installation Department, under the supervision of Mr. H. E. Blackiston, chief engineer and manager of the electricity undertaking.

The New Ipswich Showrooms

(1) The entrance hall. (2) Looking towards the main show-room. (3) The lecture and demonstration theatre. (4) The main showroom. (5) The exterior of the showrooms floodlighted

Weston Standard Cells

In a paper which they read before the Physical Society in London on January 20th, the temperature coefficient of the Weston standard cell was discussed by Messrs. P. Vigoureux and S. Watts, of the N.P.L., who have studied the effect of temperature on the e.m.f. and on the performance of acid Weston cells from −24 to +40 deg. C. The e.m.f. reached a maximum at about 3 deg., and at −20 deg. it was just over a millivolt less than the maximum. The cells behaved satisfactorily at −16 deg., but at −18 deg. freezing took place gradually and was accompanied by a rapid decrease in e.m.f. At −24 deg. the electrolyte had completely solidified, and the e.m.f. was about 12 millivolts lower than the maximum. The frozen cells resumed their normal behaviour when kept at room temperature for about a day. Cooling increased the internal resistance of the cells. The e.m.f./temperature formula in common use does not hold below 0 deg., but a slightly different formula has been obtained, valid between −20 deg. and +40 deg.

Welded Steel Poles

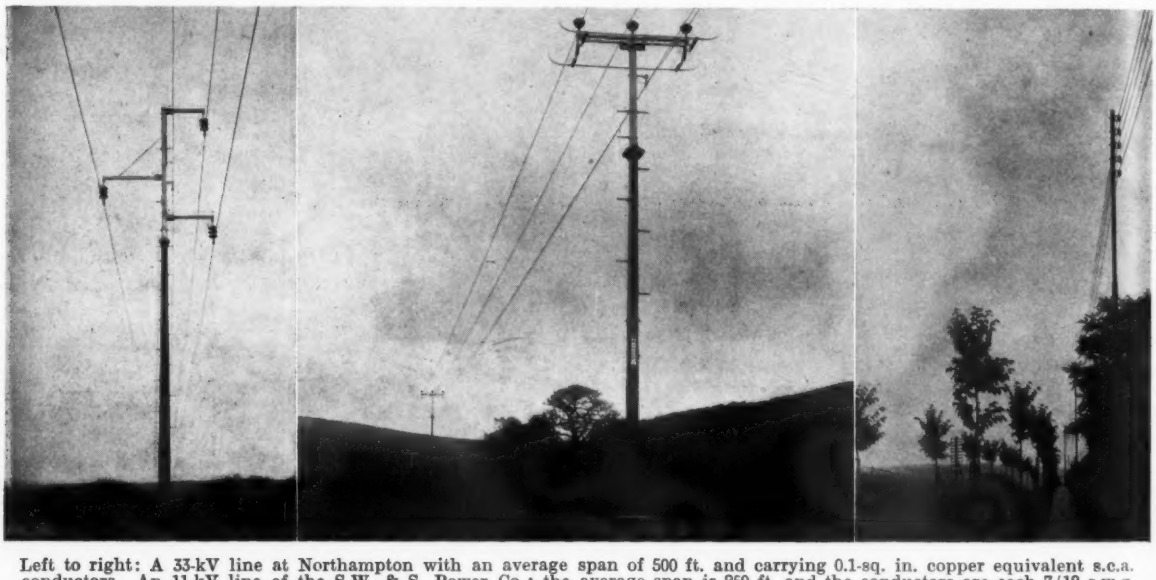
A RECENT development in overhead transmission line work is the " Fista " welded-steel pole. Preliminary designs for long spans and heavy loadings comprised two rolled-steel channels and mild-steel plates electrically arc welded to rectangular section, and for short spans for l.p. distribution consisted of two rolled-steel angles similarly welded to square section. But fabrication costs have recently been considerably reduced by employing mild-steel plates which are pressed to the required section, so that it is necessary to weld one joint only throughout the length of the pole.

The advantages of this construction are that the metal is located where it is required for maximum strength, and materials of thinner gauge than normally employed in structural work can now be safely used, thus combining lightness with strength. By welding on end plates at the top and base, the poles are hermetically sealed and internal corrosion is prevented. If required, the sealed structure can be subjected to an air pressure test. External corrosion is prevented by galvanising or painting. Exceptional torsional stability is afforded, a point which will be appreciated by engineers who have experienced trouble due to dancing or broken conductors, caused by the instability of supports.

One of the principal claims made for these poles is that their price is moderate compared with those of other types of support. Other claims are that the poles are lighter, strength for strength, than timber or concrete ones; are stiffer than wood poles of the same strength; stand rougher handling than do timber poles; require no earthing wires down the support in many cases, and no separate earthing stake; can be easily and cheaply modified in design either before or after erection, and are not subjected to attack by parasites or rot.

The poles are of pleasing appearance, and by virtue of their small cross section they take up very little ground space, an important point where wayleave difficulties are experienced. Low-pressure poles can be designed as self-supporting, without stays, a great advantage where lines are erected on the edge of the pavement, usually necessitating a considerable number of angle supports. Kicking blocks of reinforced-steel plate or wood sleepers can easily be attached to the pole for the foundations.

Interchangeable lower sections can be supplied with a range of extension pieces, so as to allow a standard body section to be manufactured for a given line. Various designs have been produced by Messrs. Ashmore, Benson, Pease & Co., Ltd., in conjunction with the J. L. Eve Construction Co., Ltd., the latter company having supplied and erected e.h.p. and l.p. lines employing these supports for several large electricity undertakings. The sole rights for the manufacture and exploitation of the poles are held by the former company. Numerous tests to comply with the Electricity Commissioners' requirements have been carried out, and it has been ascertained that these poles when overloaded bend but do not break.



Left to right: A 33-kV line at Northampton with an average span of 500 ft. and carrying 0.1-sq. in. copper equivalent s.c.a. conductors. An 11-kV line of the S.W. & S. Power Co.; the average span is 250 ft. and the conductors are each 7/12 s.w.g. Above the joint the pole is galvanised, the bottom section is painted, and pole maintenance up to the joint can be carried out with the line alive. A welded-steel pole l.p. line at Brighton supporting four 0.1-sq. in. copper conductors and a 0.0225-sq. in. copper switch wire; the maximum span is 180 ft.

A pole designed for an actual line and to specified loads was tested. It was 44 ft. 3 in. long overall, and the base was 6 ft. below ground level. The section at the base was 6 in. by 16¾ in., and at a point 10 ft. from the top 6 in. by 8 in. An earth foundation with standard wood kicking blocks was employed, and the following loads were applied: 3 by 3,500 lb. vertically, and 3,460 lb. horizontally at the pole top across the track; 3 by 3,500 lb. vertically and 900 lb. horizontally at the top along the track. The maximum movement of the base was 4½ in. at ground level, and the deflections at the top were 52¾ in. across track and 43 in. along track. In spite of the very large deflections there was no measurable permanent set in the poles.

Telephone Progress

THE London Telephone Area now covers approximately 1,200 sq. miles and has sixty automatic and 168 manual exchanges, representing 463,000 exchange lines (an increase of 37,000 over a year ago, including 25,000 due to an extension of the area). The number of telephones is now 787,000—an increase of 56,000, two-thirds of which is due to the extension of the area. The number of calls originated last year was 745 million.

The voice-frequency key-recording system has been considerably extended. This enables subscribers on manual exchanges to be connected to those on automatic exchanges without the intervention of operators at the latter. The teleprinter and " Telex " services inaugurated last year are working well with an average of nearly 800 printergrams per day (ELECTRICAL REVIEW, November 18th and 25th, 1932). Direct radio-telephone services were made available to Perth, the Belgian Congo, Montreal, Egypt, South Africa (large towns), Argentina, Uruguay, Chile, Minas Geraes (Brazil), and Venezuela. The only European countries to which telephone service for London is not available are Albania and Turkey.

The " on demand " system has been considerably extended. Owing to trade depression the phonogram service has not expanded as in the past few years. Fifteen new automatic exchanges were brought into service in 1932, and there are now forty-nine of them within a ten-mile radius of Oxford Circus with accommodation for 238,000 lines. Four rural unattended exchanges for fifty lines each have been opened. The total length of wire for subscribers' lines is 3.6 million miles. Last year electric lighting controlled by time switches was installed in more than 500 kiosks.

In Manchester the number of telephones in use is 98,972, and calls originated locally numbered 64½ million. Several new automatic equipments (replacing magneto plant) have been installed, which has necessitated the provision of a large number of new cables to carry the junction traffic. The " on demand " system will probably be completed this year. New telephone kiosks are being constantly provided, the present number being 832. Teleprinter working has been introduced on all the important circuits from Manchester; " Telex " facilities will be provided wherever there are telephones.

The New Cambridge Laboratory

Apparatus for producing strong magnetic fields and low temperatures

OFFICIALLY opening the Royal Society Mond Laboratory at Cambridge on February 3rd, the Chancellor of the University, Mr. Stanley Baldwin, said that the development of industry to-day was dependent more and more on the application of new ideas and discoveries in pure science. Successful industrial research was ultimately dependent on the vigorous prosecution of research in pure science with the object of adding to our knowledge of the processes of nature and generally without regard to any practical application. He recalled that it was in the Cavendish Laboratory that the discovery of the electron had been achieved by Sir J. J. Thomson, and that the possibility of radio-communication throughout the world and the triumphs of broadcasting had been largely dependent on this fundamental knowledge.

Lord Rutherford, the Cavendish Professor of Physics, gave an account of the circumstances which had led to the erection of the laboratory; Sir Gowland Hopkins, President of the Royal Society, formally presented the laboratory to the University, and Sir Robert Mond made a brief speech mentioning his father's connection with the establishment.

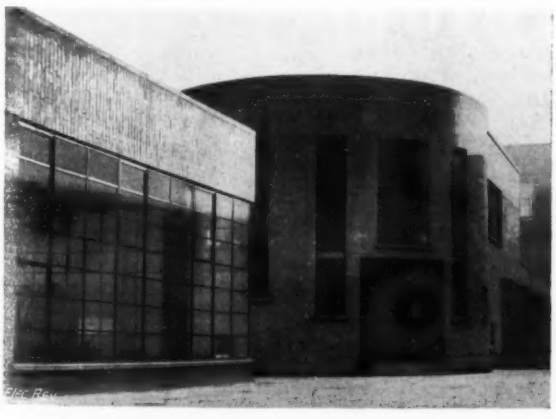
Professor P. Kapitza's researches carried out during the last ten years in the Cavendish Laboratory were devoted to the study of the influence of very strong magnetic fields and very low temperatures on solids. His work reached a stage where expensive machinery was needed, for which the Department of Scientific and Industrial Research provided the necessary funds, and the Royal Society eventually offered £15,000 for the provision of a new laboratory.

With reference to Dr. Kapitza's researches, it is known that at a temperature approaching absolute zero (−273 deg. C.) many metals and alloys show an enormous and sudden increase in electrical conductivity; at the same temperatures, salts which are generally only feebly magnetic begin to show large magnetisations in strong fields, whilst the changes of length shown by many metals with a combination of low temperatures and strong fields seem likely to throw considerable light on the nature of the structure of solids.

A Special Generator and Switching System

The importance of experiments combining the effects of strong fields and low temperatures is, therefore, clear. The fields, however, which are necessary for this work are far stronger than can be obtained by any practical electromagnet. To obtain fields still stronger it is necessary to resort to the comparatively simple principle of passing a large current through a small coil. If a power of 30,000 kW is dissipated in a coil of 7 cm. internal diameter it is possible to obtain a field of 350,000 gauss. It is, however, physically impossible to remove continuously the heat generated by 30,000 kW, and it is necessary to interrupt the experiment when the temperature of the coil has risen above 100° C., *i.e.*, in a time of the order of 1/50 second.

In Dr. Kapitza's experiments the large powers necessary are obtained by taking advantage of the well-known property possessed by an a.c. generator of producing a current on short circuit, for the first few cycles, of ten or twenty times the normal steady output current of the machine. A generator of specially low impedance was constructed by the Metropolitan-Vickers Electrical Co. in 1925, which gives a current of about 20,000 A peak value at 2,000 V when connected to a coil of equal impedance. An automatic switch driven by a cam is arranged to make the circuit to the coil at zero voltage and to break the current after one half-cycle, exactly at the point of zero current. The timing of the switch can be adjusted to one ten-thousandth of a second, and has solved the difficult problem of interrupting large powers.



The new laboratory

One of the most difficult problems met with in the work was the construction of a stable coil. The interaction of a magnetic field of 3,000,000 gauss with currents of 20,000 amperes provides a force of the order of half a ton per cm. length of conductor, and as a result the pressures in the material of the coil used rise far beyond the normal ultimate strength of copper. The difficulty was ultimately solved by using the high tensile, high conductivity cadmium-copper alloys developed recently for trolley cables, by impregnating the coils with "Bakelite," and by reinforcing the whole coil by many turns of high tensile steel tape. If it is desired at a later date to proceed to still higher fields, it may well be that the ultimate limit will be set simply by the impossibility of finding material of the necessary high conductivity which possesses at the same time a sufficiently high tensile strength.

[*Elliott & Fry*

Dr. P. Kapitza, for whose researches the new laboratory has been provided

The Liquefaction of Gases

The production of low temperatures is carried out in three stages by the liquefaction of nitrogen, hydrogen and helium. The laboratory is equipped with the latest type of air liquefier and rectification column supplied by the Heylandt Co., of Berlin, and with a modern Reavell compressor. The output of liquid nitrogen is approximately 8 gallons per hour. Liquid nitrogen has a temperature of −196° C., and, by evaporating at reduced pressures, temperatures of −209° C can be obtained. To obtain still lower temperatures, hydrogen is liquefied and gives a temperature of −253° C., whilst by evaporating at low pressures the temperature may be reduced 6 deg. still lower, to within 14 deg. of absolute zero. Hydrogen liquefaction is carried out by compressing the gas to 170 atmospheres and making use of the Joule-Thompson cooling effect on expansion.

In the new Cambridge laboratory, hydrogen and helium are stored at 10 atmospheres pressure in hollow steel forgings, and only a small floating oil-filled gas-holder is used to act as a buffer between the compressor and the storage system. Triple-stage Reavell compressors are used for the compression of hydrogen and helium, and these have been designed to completely eliminate gas leakage, oil-filled glands sealing the pistons and any gas leakage being returned to the suction side.

The liquefaction of helium is a still more complicated process. The helium is compressed to 40 atmospheres, and then, after precooling and passing through a regenerator spirit, is expanded. In order to get cooling on expansion, however, it is necessary to precool to extremely low temperatures, and only liquid hydrogen can be used for this purpose. It is necessary, therefore, to have an ample supply of liquid hydrogen in order to produce liquid helium. The hydrogen liquefier used in the laboratory has an output of 5 litres per hour, and the helium liquefier will be designed for an output of about one-half this volume. The construction of the liquefaction room has several points of interest, great precautions having been taken to minimise the risks of explosion.

The construction of the remainder of the laboratory has been dictated by the necessity for preventing the transmission of vibration and noise from the heavy machinery to the research rooms of the building. A central main hall houses the large generator for producing intense fields, and will house future heavy apparatus. Round this hall at one end are grouped the machine and compressor rooms, whilst the research rooms open off the hall at the other end. Each research room is provided with a complete set of the essential services, and different varieties of electrical power, access through a flexible switching system to a number of generators and accurate timing impulses. The temperature of each room is controlled thermostatically, and heavy galvanometer foundations and earthing systems are supplied, and wooden battens on the walls are provided for the ready fixing of apparatus.

The Dumfries County Scheme

THE Dumfriesshire County Council's electricity distribution scheme was formally inaugurated on Saturday last by Sir Andrew R. Duncan (Chairman, Central Electricity Board). Some 500 people took part in the ceremony in the Town Hall, Lockerbie, and an electrical exhibition was held during the week, in which the following companies took part:—British National Electrics, Ltd., Simplex Electric Co., Ltd., Edison Swan Electric Co., Ltd., General Electric Co., Ltd., Carron Company, English Electric Co., Ltd., Jackson Electric Stove Co., Ltd., Ferranti, Ltd., and Callender's Cable and Construction Co., Ltd.

Left: The main sub-station at Gretna. Centre: Three-wire intermediate wood poles near Closeburn. Right: A steel-cored aluminium line and P.O. guard near Penpont

Mr. H. S. Gladstone, Convener of the County, presided, and those present included Sir Archibald Page (general manager, C.E.B.), Mr. A. E. McColl (C.E.B. manager for Scotland), Major J. G. Crabbe (chairman, Dumfries C.C. Electricity Committee), Messrs. John Robson (County Clerk), J. S. Pickles (county electrical engineer), C. W. Salt (Carlisle), W. C. Bexon (Ayrshire Electricity Board), W. S. Sawtell (Scottish Southern Electric Supply Co.), A. E. Roots (Burgh of Dumfries), F. de B. Hart, and G. A. Randle (Callender's), J. Orr (James Kilpatrick and Son), and J. Taylor (secretary, I.E.E. Scottish Centre).

The Chairman explained that the County Council initiated the scheme after a request had been received from the city of Carlisle five years ago to be allowed to extend its area of supply across the border. The County Council decided to undertake the supply itself and in this it was wholeheartedly supported by the councils of the six burghs of the county. The grid was the obvious source of supply.

Mr. J. S. Pickles, A.M.I.E.E., the Dumfries county electrical engineer

Sir Andrew switched on the electric light in the hitherto gas-lighted hall, and at the same time the exterior of the building was floodlighted. Sir Andrew referred to three notable features of the scheme. The first was that it was based on the grid, and a national supply for the southern link was made economically possible only by the utilisation of the water power of Galloway. They had now at their disposal a bulk supply at a price which was almost equivalent to the cost of generation at the largest stations in some of the most densely populated districts. The second feature was that for the first time in the country a county council had undertaken operation and distribution, with the result that Dumfriesshire started with a comprehensive supply that was not really matched in any county. The third and most important feature was that the tariff was as low as most tariffs that had been in operation in parts of the country that had been highly developed electrically for many years, and he had not the slightest doubt as to the success of the scheme. He believed wholeheartedly that the Dumfriesshire County Council had shown wisdom and foresight in engaging in a scheme of that kind. He believed he would live to see the day when the grid scheme would be acclaimed as being one of the wisest measures of reconstruction, and what was true of the grid was equally true of electricity supply in Dumfriesshire.

Major Crabbe moved a vote of thanks to Sir Andrew and expressed indebtedness to Mr. Pickles and to Mr. C. R. Westlake, now chief electrical engineer of Ulster and formerly resident electrical engineer at Gretna.

The Scope of the Scheme

The County Council is operating under the Dumfriesshire Electricity Orders of 1929 and 1931 covering the whole area of the county, excluding only the Burgh of Dumfries. The whole area is 1,000 sq. miles, only 600 of which are inhabited. The effective density of population is 100 per sq. mile, or 60,000 in all. The area includes six small towns, none of which has much over two thousand inhabitants. The grid supply at a pressure of 33 kV is taken at two points—Dumfries and Gretna.

For the 245 miles of 33- and 11-kV transmission, single and double-circuit 0.05 sq. in. s.c.a. and 7/12 s.w.g. galvanised steel lines are employed; underground cables are used only in short lengths for sub-station connections. For crossing the River Annan, 112-ft. towers were necessary. Distribution at 400/230 V is also overhead (63 miles) except in the principal streets of the six burghs and three large villages, where there are sixteen sub-stations. Supplies will also be given in more than fifty villages, usually from pole-mounted transformers. The copper conductors are in vertical formation on wooden poles.

An intensive canvass of the county has resulted in 3,300 out of a possible 14,000 consumers being obtained. The canvass has been supported by lectures and publicity methods including a demonstration van, which attracted nearly 10,000 visitors. In Gretna and Eastriggs, where 430 consumers have been supplied under temporary arrangements, over 100 cookers have been installed. Several quarries and tweed mills will provide a power load and the supersession of the many private plants on farms, &c., is expected. The whole of the construction work, to the design and specifications of Mr. J. S. Pickles, has been supervised and controlled by the Council's staff.

The principal contractors for the scheme were Callender's Cable & Construction Co., Ltd., who provided all the e.h.v. and l.v. overhead lines and chief sub-stations. Other contractors for the main work were: J. Kilpatrick & Son, Ltd., underground cables; Crompton Parkinson, Ltd., kiosk sub-stations; the Harland Engineering Co., Ltd., switchgear; and Switchgear & Cowans, Ltd., switchgear.

The Faraday House Supper-dance

The Faraday House Old Students' Association and Rugby Club have arranged to hold a supper-dance on February 24th at the Hotel Russell, London. The price of a double ticket is 15s., including supper, and of a single ticket 8s. 6d., obtainable from the Faraday House O.S.A., 66, Southampton Row, W.C.1.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Electricity at Sea

"THE Growth of Electricity in Ships" was the title of the paper read by Mr. F. Johnston before the BELFAST ASSOCIATION OF ENGINEERS on February 1st. Early installations are described, the progress made in the last thirty years being shown by the fact that on our largest merchant vessels of to-day the size of the individual units has reached 900 to 1,000 kW, while units of over 2,000 kW are being installed on the new C.G.T. vessel *Normandie* for auxiliary purposes, and four units of 40,000 s.h.p. each for propelling the vessel through the water. Thus on this vessel there is no less than 160,000 s.h.p. for propulsion and 20,000 b.h.p. used in electrical power for the auxiliaries.

Recent Applications

Electric propulsion is slowly but surely coming into its own. Perhaps the chief obstacle is that of higher first cost, which, except for tug boats and ferries, is difficult to justify on paper. The fact, however, that owners who have given electric propulsion a trial have invariably continued to adopt this mode of propulsion in their new tonnage, seems to be ample evidence of its earning capacity. The total h.p. of electric ship propulsion throughout the world is now well over one million, while during the last three years the following British built electrically propelled vessels have been put into commission :—*Strathnaver* (28,000 h.p.), *Strathaird* (28,000 h.p.), *Monarch of Bermuda* (18,000 h.p.), *Rangatira* (13,000 h.p.), *Musa* (7,000 h.p.), *Platano* (7,000 h.p.), *Perman* (2,800 h.p.), *Winkler* (2,800 h.p.), *Lockfyne* (1,340 h.p.), and *Cementkarrier* (775 h.p.). Apart from "all-electric" propulsion, supplementary electric drive from 1,000 to 1,600 s.h.p., in which exhaust steam from reciprocating engines is used to drive turbo-generators, to supply current to motors on the propeller shafts, has been installed on several existing vessels.

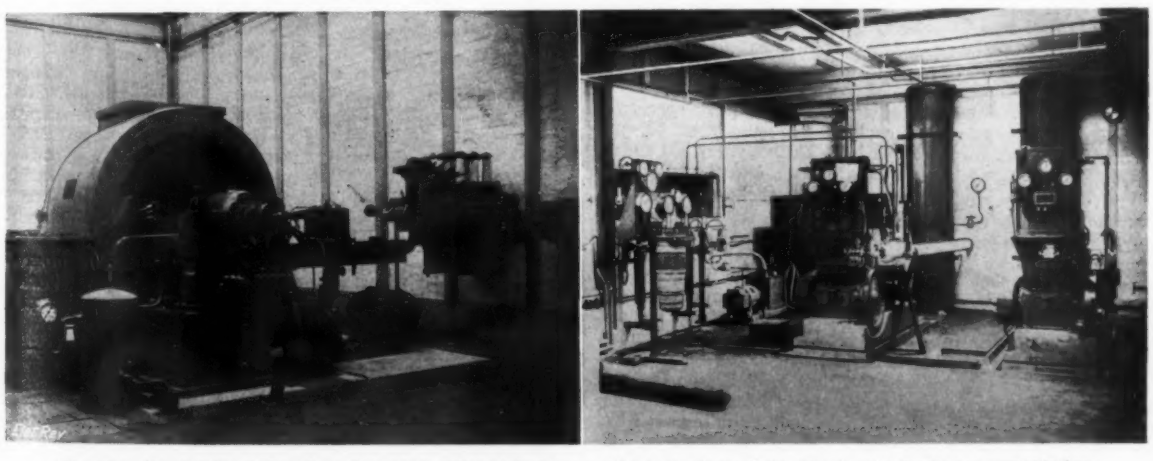
In recent installations in the mercantile marine lead covered wires have in many cases been entirely dispensed with, due to cracking of the lead, owing to the growth of the crystalline structure of the metal with changes of temperature, and to the continuous bending action to which the sheathing is subjected on board ship. The trouble has been entirely removed in some installations by the adoption of a so-called "hard rubber" protection. This name is a little unfortunate in that one of its principal good qualities is that it contains a very small percentage of rubber, and is therefore unaffected by oil vapour and does not readily support combustion. Cambric insulated cables, lead sheathed, in various forms, have been used to a limited extent. They have the advantage that they can be loaded up to higher current densities than cables with rubber insulation, but some care has to be exercised to prevent the ingress of moisture at the ends.

In the lighting load of a ship cheese-paring is luckily quite uncalled for. Even if the number of lights were to be doubled it would only increase the total connected load by about 8 per cent. A recent 25,000-ton passenger vessel has four Diesel-driven generators, each of 500 kW, and one Diesel-driven emergency generator of 75 kW. The connected load in kW is made up as follows :—Twelve three-ton cargo winches (317), 4 five-ton winches (135), 2 warping winches (115), 2 capstans (189), 2 windlasses (317), 20 boat winches (200), 8 elevators and hoists (26), 4 gymnasium machines (2), 20 service motors (17), 85 ventilating fans (335), 8 watertight doors (8), 2 steering gears (167), 2 refrigerating compressors (150), 5 refrigerating machine pumps (31), 3 refrigerating machine fans (21), 2 emergency plant cooler motors (4), 100 engine room pump motors (1,160), 34 cooking equipments (999), 21 water boilers, &c. (83), 1 gyro-compass equipment (3), 1 talkie equipment (6), oil heaters (2), electric cabin heaters (270), electric lighting installation (390), making a total of 4,947 kW. In addition, there is the low pressure installation fed from a small motor-generator and battery, from which are controlled the bells, luminous indicators, telephones, clocks, alarms, gramophone repeaters, &c.

Booster control for capstans and windlasses has considerably greater relative advantages than for cargo winches. The Ward Leonard system necessitates larger and more expensive motors. Electric winches consume only about 1/5th to 1/7th the fuel consumed by a steam winch, and also have the advantage that they can be made noiseless. The use of passenger and service hoists has noticeably increased, and as many as twelve or fifteen on one vessel is not unusual. The ventilation of the modern liner is now a very important part of the electrical installation. In a very moderate size of passenger vessel there are not less than 85 fans, the smallest of which are 12½ in. diam., and the largest 60 in. diam. The latter require 50-h.p. motors each. Distant control is now general.

Cooking and Heating

Perhaps the most noticeable recent change in electrically driven engine room auxiliaries has been the adoption of vertical pumps and motors. They take up less floor space and enable the impellers to be more readily flooded. Electric cooking is continuing to make steady headway and has been employed by most of the large passenger liners. Progress was at first hampered by the flimsy nature of some of the early cookers installed, but experience has taught its lessons and the upkeep of the modern electric range is less than in the old coal ranges. Apart from warm air circulation by means of electrically driven fans delivering air through banks of steam coils, which is perhaps the most efficient form of general heating, it is now the custom to have individual electric heaters in each cabin.



The New Cambridge Laboratory (see page 191): Left, the special generator; right, the liquid hydrogen installation

The Trend of Electrical Engineering

HAVING outlined the early development of electricity in the lecture which he delivered on this subject at the HERIOT-WATT COLLEGE, Edinburgh, on January 30th, Prof. F. G. Baily remarked that the last forty years, so far as real novelty of application was concerned, had been comparatively barren. The early inventors foresaw the possibilities and indicated ways of carrying them out with wonderful insight. The improvement of lamps had been remarkable. Electric motors had outdistanced all competitors. Electric heating had, however, a more difficult fight, and its extension was chiefly a question of the price of electrical energy.

In the generating station no great improvement could be expected, for both engines and dynamos were approaching the theoretical limits of efficiency, and no other source of energy

was even dimly to be perceived. The chief items in the ultimate cost to the consumer were caused in the distribution from the station, and they could be reduced only by a larger and more general consumption. This, however, was steadily improving, and every reduction in cost resulted in larger use.

The present time was apparently the beginning of a new era of invention. The small rectifying valve invented by Fleming depended essentially on the behaviour of electrons in a vacuum, and De Forest's third electrode gave control of the behaviour of these small valves and from these ideas had sprung up a numerous progeny—rectifiers, amplifiers, high-frequency generators, photo-electric cells, and combinations of these with each other and with electro-magnetic relays, which were giving new powers of varied kinds. These might profoundly modify the distribution and control of electricity over the country.

Distribution Development

THE discussion at the INSTITUTION OF ELECTRICAL ENGINEERS on February 2nd of the paper read by Mr. J. M. Kennedy and Miss D. M. Noakes on "An Analysis of the Costs of Electricity Supply and Distribution in Great Britain, with some Suggestions as to the Causes of and Remedies for the Slow Rate of Development" (see our last issue), was opened by Capt. J. M. Donaldson, who claimed that never had there been such electrical development as in the last two years, but supply in the villages should not be given at the expense of the towns. Generation and distribution capital efficiencies were not comparable, because generation was now standardised, whereas much distribution capital had to be expended before any return could be obtained, and the return would not be as large in rural areas.

Capt. J. M. Donaldson, who opened the discussion on the I.E.E. paper by Mr. J. M. Kennedy and Miss Noakes

The distribution capital which had been criticised in the paper included large expenditures for bringing old systems up to date. Distribution was essentially not a subject to be dealt with by any board of the kind suggested, as it involved personal contact with the consumers. The existing distribution authorities which had already done such good work and had the organisation should continue and be given greater powers to carry on the good work.

Lt.-Col. W. A. Vignoles expressed the view that the high efficiency of generation capital arose out of the installation of large units under the grid scheme and the cost per kW of these was low. In determining the manner in which distribution had developed, account must be taken of the average price obtained, the number of kWh per consumer, and the proportion of consumers as compared to the total in the area. On this basis a great deal had been done, particularly as the result of the propaganda work of E.D.A. Some thirty-six million people were living in areas where electricity could be obtained at 1d. per kWh on a two-part tariff; twenty million could obtain supply at ¾d. per kWh; and ten million at ½d. per kWh. There were 300 undertakings supplying at 1d. per kWh or less, and the kWh sold per £ inevitably tended to diminish in the early stages of development in sparsely populated areas.

Small undertakings which could not afford the necessary facilities, might be combined in some way. All undertakings should be compelled to subscribe to a fund for publicity and propaganda. It would be impracticable to attempt to impose one tariff on a large area such as that proposed for the distribution boards because for real development there must always be a large number of tariffs. That was seen all the world over. The rate book of the New York Edison Co. was as big a volume as the Institution wiring rules. Distribution was a matter of salesmanship and personality, finding out what the consumer wanted, and giving it to him; that could only be done efficiently by those having knowledge of the local conditions.

What Hull and Wimbledon Have Done

Mr. J. N. Waite (Hull) agreed with the authors' general conclusions as to the need for a progressive policy but denied that little or no progress had been made during the past ten years in distribution. No house was too small to consider as a market for electricity; indeed, the domestic market was as great as all the others put together. In Hull during the four years 1928-29 to 1932-33, the kWh sold had increased by 63 per cent., the income by 46 per cent., consumers by 148 per cent., and domestic sales by 529 per cent. Cookers had increased from 0 to 6,580; assisted wiring consumers from 189 to 14,626, and the revenue for electricity from them from £45 to £37,500. The sum of £120,000 had been paid to wiring contractors; concessions to consumers in the form of reduced rates, abolition of meter rents, &c., amounted to £135,000. The net profits over the period averaged £49,547 and the number of employés had increased from 235 to 708.

These results proved that any attempt to sell electricity on a large scale without attractive tariffs was hopeless, and undoubtedly there must be a complete change of heart on the part of those controlling the destinies of many statutory undertakings; otherwise they would find themselves dispossessed of control. The larger undertakings were, however, adopting such a policy as that advocated in the paper.

Mr. A. E. McKenzie said that in Wimbledon, the Sunday morning load in 1922 was 52 per cent. of the maximum weekly demand; last year it was 90 per cent. The maximum load on the Wimbledon undertaking would occur on Sunday morning due to electric cooking and if the Central Electricity Board was to insist on the kW charge for bulk supply being based on this load it would tend to retard development. He believed the Sunday morning demand in a few years would be two or three times that at any other time. In Wimbledon 86 per cent. of the houses were wired as against less than 40 per cent. in most other places. This development had taken place on a low flat rate, and with a sufficiently low average price the business could be obtained. Until a few years ago many undertakings had not developed the domestic load, which accounted for eight million out of eleven million houses being still unwired.

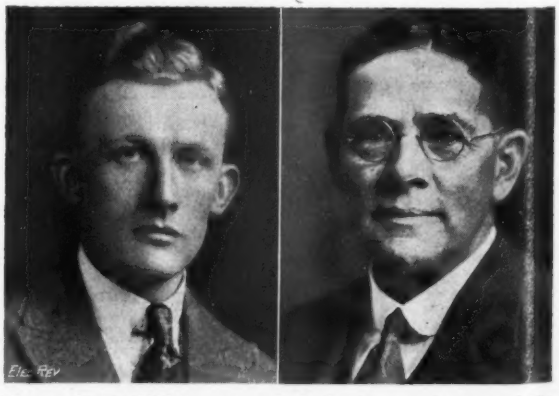
Generation and Distribution Capital Not Comparable

Mr. G. W. Partridge held that capital spent on extensions for distribution purposes must often remain unremunerative for a period. The distance of the consumers from the generating station and the number of consumers per mile of main must come into consideration. Much remained to be done by way of standardisation of voltage and the application of suitable tariffs, but distributors of electricity should not be treated differently from the distributors of gas or water which had not four or five boards over them.

Mr. J. W. T. Townley pointed out that the authors had taken the gross capital expenditure from the Commissioners' returns which included expenditure upon mains long since taken out of use. Ten years ago the supply undertakings were dealing with the cream of the business, but they were now catering for poorer consumers.

The rapid increase in the number of assisted wiring consumers in the East London boroughs (75,000 during the past five years) was materially reducing the kWh sold per £, but even these consumers having once enjoyed the advantages of electricity for lighting soon desired to extend. In West Ham in 1925 the kWh sold per £ of distribution capital amounted to 113 but in five years during which some £20,000 had been spent, the number had fallen to 68. This meant that capital had been expended in advance and would eventually prove productive. Whilst some co-ordination might be necessary here and there, the larger undertakings were undoubtedly doing their job exceedingly well.

All the speakers (who, as will be seen, represented progressive undertakings), deprecated the formation of distribution boards on the lines suggested by the authors. The discussion was adjourned until yesterday (Thursday) evening.



Messrs. E. R. Wilkinson and C. S. Davidson, who opened the discussion at the informal meeting of the I.E.E. on Monday last on "The Grid and its Fulfilment of National Requirements"

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Undue Preference

I shall be glad of the opinion of your readers on the following. A Joint Electricity Authority in its distribution area is supplying thermal storage cookers, loaded at 500 W, at an inclusive charge for current, hire, &c., of £9 per annum. These cookers have a 100 per cent. load factor and consume 4,380 kWh per annum, which works out at 0.495d. per kWh. The same authority supplies in bulk to several towns in the district at the rate of £4 per kW plus ¼d. per kWh.

I should like to know how the towns taking bulk supply at the above rate can supply thermal storage cookers at similar charges to the above which, being in the same district, they will be expected to do, when the number of kWh taken and the maximum demand charge will amount to £11 2s. 6d. per annum, to which of course will have to be added distribution charges, conversion losses, and interest and depreciation on the cooker.

Sections 19 and 20 of the Electricity Act, 1882, state that no undue preference shall be given to any consumer taking supply under similar conditions, but it appears that private consumers are now to get better terms than distributing authorities taking bulk supplies. RHADAMANTHUS.

January 31st.

Efficiency or Efficacy?

The figures quoted in your leader of January 27th are very misleading, because they are based on existing procedure, instead of what should be. This is due to the wasteful use of coal for steam plant, which in turn necessitates the otherwise entirely unnecessary grid for long distance distribution. It is also due to the wasteful production of illuminating gas instead of fuel gas.

You refer to three means of heating, electrical energy (not electricity), gas (but do not say that you mean the wasteful illuminating gas), and coal. The last may be dismissed straight away in a technical comparison as it should have been prohibited for domestic use fifty years ago. Your figures for gas, instead of being 10,000 B.th.u. for 1d. at 10d. per therm then become 100,000 B.th.u. at 1d. per therm. Further, the words "but cannot use" are incorrect as you are fully aware. The fact that the gas industry does not make and sell suitable apparatus for using fuel gas does not justify you in ignoring facts that you learned (or should have learned) in your training. Heating by electricity at 3,412 B.th.u. to the unit, and lighting by gas (of any sort) are easily the two most obvious abominable uses of our national asset coal that can be mentioned. Burning raw coal in an open grate may be as bad, but is excusable, perhaps, on the grounds that our aboriginal ancestors did the same with wood.

In any case, now that internal-combustion engine plant is obtainable at less than half the cost of steam plant, is automatic in action, and dispenses with the grid, its use should be compulsory. The excuse that it was not sufficiently developed in 1882 to be considered had vanished by 1903, when Bramwell made provision for its reconsideration in 1931. Unfortunately he allowed too long a time for development, and the vile and wasteful super-stations, commencing with Lots Road (which I ridiculed at the time as a monument of American folly) and continuing with those at Barking and Battersea, might have been spared us. Local production of electrical energy eliminates the wasteful and unnecessary grid. The two-in-series, 250-0-250 V d.c. concentric cable, with uninsulated outer, available in 1882, renders all form of leakage impossible, because the earthed outer causes an immediate short-circuit, and the single fuse blows at once.

Another case of avoidable death due to an electric shock occurred in a bath this week in Yorkshire. Cannot common humanity insist on legislation to prevent these vile accidents? And we have foolish, unnecessary rules for the prevention of what should not and need not be possible. Also an Institution of Electrical Engineers, a Cable Makers' Association, and an electrical Press that suppresses the exposure of the vile waste by dishonest monopoly. E. G. PINK.

London, S.E.12, *January 31st.*

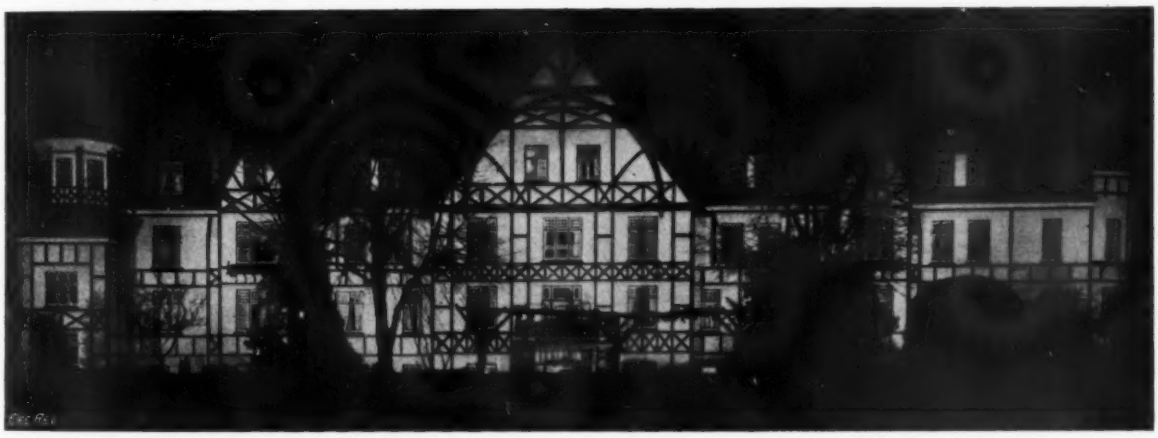
Distribution Must be Speeded Up!

Your current issue is specially interesting to those engaged in the development of rural districts, and the views of one closely connected with rural distribution may be of interest. Referring to your leading article for the speeding up of distribution a big time saving could be effected if less time were taken in obtaining the Ministry of Transport's consent, and the approval of local authorities. The latter should delegate their powers to either their chairman or vice-chairman, so that each proposed overhead scheme could be dealt with much quicker, and not have to wait until the usual monthly meeting. (I have had to wait as long as two months.) It is to their interest to get people to return to live in the country, and would also assist in alleviating the unemployment problem. The time taken by the Ministry of Transport in giving a decision after an inquiry has been held should also be reduced.

In one instance I found a county authority pushing its responsibility on to the shoulders of the local branch of a preservation council. Although this society has been very good to work with it takes up valuable time. Two things with which the townsman is not familiar are the spending capability of the rural worker and the sparseness of population. A man with 27s. 6d. to 30s. per week cannot afford more than a shilling a week for electricity, no matter whether the unit price is .5d. or 1.5d. A town undertaking deals with a matter of perhaps 1,000 per square mile as against the rural 100.

If anything can be done to lessen the delays mentioned, I am sure rural engineers will be delighted. ONE OF THEM.

February 6th.



A picture of the floodlighted Worcestershire Brine Baths Hotel sent us by the S.W.S. Electric Power Co.

Safeguarding the Service Connection

Correspondence has appeared from time to time in the technical Press regarding the protection of a supply undertaking's service main, from the point of entry into the consumer's premises to the line terminals of the meter. A perfect system would be one in which it was impossible for the consumer to obtain access to any part of the service line, main fuse, or meter, except the load terminals of the last. This condition is only partially fulfilled by the common practice of sealing the meter and cut-out and enclosing the interconnecting leads in conduit. The ideal substitute for this would be provided by a meter cut-out unit in which all interconnections would be made internally, the whole unit being sealed by the supply

authority, a seal which would only be broken when fuse renewals were required.

Such a unit, consisting of a meter, a sealing chamber in the case of paper cables, a fuse and a neutral link, need be neither bulky nor expensive; in fact, in the case of a 230-V twin a.c. service the overall dimensions need not be greater than 12 in. by 6 in. A device of this kind would have the following advantages: complete immunity from unauthorised interference, such as meter by-passing; only one lock or seal would be required; and the entire unit could be bonded to the armour-clamp of the cable thus giving complete safety.

In the case of overhead services it is very often necessary to separate the meter and cut-out, owing to domestic reasons; for instance, it is obviously inconvenient to place the former in a bedroom, where the supply main may enter the house. It has been my practice in such a case to have the interconnection run in twin lead covered v.i.r. cable, which does not present such obvious temptation to the tamperer as c.t.s. or braided v.i.r. run in cleats. Steel barrel would doubtless be preferable, but the added expense seems to nullify any advantage obtained by its use. I should be glad to hear what systems are in use elsewhere, as the question is an important one.

JOS. C. G. BELL, *Resident Assistant*,
U.D.C. Electricity Department.

Carrickfergus, *January 31st.*

The Suggestion Box

I happen to be one whose business it is to call upon engineers and buyers to works and mills of all descriptions, and during visits I am enabled very often to see the inside workings of these concerns. One point in particular that impresses me is that quite a large number of them have a suggestion box, generally in a prominent position. This, of course, is a direct invitation from the management to all of its employés (to the workman as well as to the staff) to contribute suggestions of a helpful nature in promoting the efficiency and smooth running of the company.

From the workpeople, including charge hands and foremen, the management would welcome suggestions which would lead to improvement in, for instance, process work brought about by such things as alteration of lighting; different methods of handling the work from department to department; quicker attention and serving at the stores both for detail assemblies and tools: different arrangements of fixing up on machines, and so on for quite a number of operations that all have some part in shop practice. Similarly from the staff the management would expect suggestions for improvement in general office routine, such as same-day invoicing and crediting: quicker methods of estimating, costing, issuing of orders to the works, &c.; salesmanship, and despatching of orders to customers.

All such suggestions and many more will at some time or other find their way to the box, but unfortunately the management may not find it opportune to act upon the suggested advice immediately. This has the effect of curbing endeavour and, moreover, creates a feeling that there is a lack of interest. To prevent this I would suggest that managements act as prompters, thereby directing ideas into definite channels. This would naturally inspire in the keen and energetic fellow the urge to better himself, and give him an added interest in his firm. Further, with a definite goal in view there will be far greater and more fruitful use of the suggestion box.

Manchester, *February 2nd.* P. S. HAWORTH.

Bathroom Fatalities

On page 174 in your issue for February 3rd, you refer to a fatality which occurred at Newcastle. The Press reports indicated that deceased had recently suffered from influenza, and, owing to an attack of giddiness, had fallen on to an electric radiator in a bathroom and died from burns received. This is not correct, as there is ample evidence to show that the victim was killed by electric shock.

The circumstances are, to me, unusual, and therefore worthy of note so that similar conditions may be looked for, and accidents avoided even in other situations than bathrooms. The radiator was of the usual type with a metal case. There was evidence of the deceased having received an electric shock in that a perfect imprint of his hand was found on a chromium plated towel dryer which was connected to the water system.

On testing the radiator approximately 1 megohm was shown between the live metal and the case. The flex, which was twin twisted, 70/36 double v.i.r., appeared to be above suspicion, but, almost by accident, a single strand of the conductor was found protruding slightly through the braiding about one inch from the radiator terminal block. Normally, the flex would hang down and the single strand would not have made contact with the radiator case, but, by a thousand to one chance, the flex was hooked over a wing nut on the back of the radiator, and the protruding wire was pressed against the case, thereby making it alive (the elements were switched on).

On examination, the flex proved to be damaged, by conducted heat, for about 2 in. from the terminal block. The rubber had perished and had cracked. The outer layer of the conductor wires had become brittle and many were broken into lengths of about half an inch. One of these short pieces had worked through a crack in the rubber and penetrated the braiding. It is safe to assume that the victim had received a fatal shock, his body eventually falling on to the radiator, which was still switched on, and that the ensuing burns were *post mortem*.

R. E. NUFLEX.

February 6th.

Peaks and Charges

On a morning last week I had before me for consideration two rather interesting communications. The first was from the statistics department of my generating station, which consisted of a table comparing this winter's figures with those obtained last year; as these may be of interest to other supply engineers I send the following table:—

	1931-32.	1932-33.	Increase.	Per cent.
M.d. (half hour) kW:				
4.30 p.m.	2,184	2,320	136	6.2
8.30 a.m.	1,830	2,260	430	23.5
11.30 a.m.	1,740	2,100	360	20.6
kWh generated:				
6 a.m. to 2 p.m.	11,440	13,920	2,480	21.6
2 p.m. to 10 p.m.	13,910	14,940	1,030	7.5
10 p.m. to 6 a.m.	3,830	4,260	430	11.0
kWh daily	28,220	32,540	4,320	15.2
kWh weekly	163,580	204,810	41,230	25.2
kWh up to Jan. 28th	5,002,410	5,733,090	730,680	14.5

The biggest half-hour load during the mornings is only 60 kW short of the usual peak load experienced in the evenings before Christmas. We are thus approaching a time when the peak load will occur probably between 8 and 8.30 a.m. We have brought this situation about by encouraging customers to limit their demand during the usual peak load time in the evening, and by encouraging them to use electricity for all purposes during the day.

As soon as the peak load occurs at times other than the evening the people to whom we are selling cheap electricity will regulate the amount of plant which we have to keep, or alternatively the kW demand which we have to pay for from the grid. What are we going to do then? Are we going to raise the price for purposes other than lighting and regard the electricity supplied for lighting as a by-product? If so, we shall probably lose the load which has only been secured at the low prices resulting from disregarding peak load charges. The comments of your readers on this point would be of interest.

My second communication was from a water company which is considering the possible purchase of half a million kWh from us at 0.4d. per kWh, provided supply is not taken between the hours of 4 p.m. and 7 p.m. in the months of November, December, January and February. Alternative costs to the water company worked out on a Diesel installation to 0.35d. per kWh and in this case there would be no restriction on the time of running. If I accept this load there is no doubt that in a year or so it will contribute to my peak in the morning, which I shall have to pay for at £3 or £4 per kW; in that case I do not see how we are to make any profit out of it towards our establishment charges, and the supply would probably result in a loss. On the other hand, it goes against the grain to turn down any application which will promote the further use of electricity.

H. WILSON,
Chief Engineer,
U.D.C. Electricity Dept.

Ashford, *February 2nd.*

The E.A.W.

Owing to various circumstances, including the fact that March 17th is the date on which the Batti-Wallahs' Ball is taking place, it has been decided to change the date of the E.A.W. Ball to Friday, April 7th, at the Dorchester Hotel. An attractive cabaret is being arranged by Mrs. Dennis Sprague (Miss Rosemary Northcroft), which will include Miss Ena Grossmith and party.

On January 24th a large party of members visited the Building Centre, New Bond Street, where it was received by Mr. F. R. Yerbury and Mr. A. C. Cramb. Mr. Yerbury gave a short talk on "The Modern Trend in Building" in which he stressed the value of co-operation between the architect, the builder, and the electrical contractor.

"Useful Information for the Countrywoman" is the title of a leaflet which has been reprinted from the *Electrical Age* at the special request of the National Federation of Women's Institutes and published by the E.A.W., price 1d.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A New Vacuum Cleaner

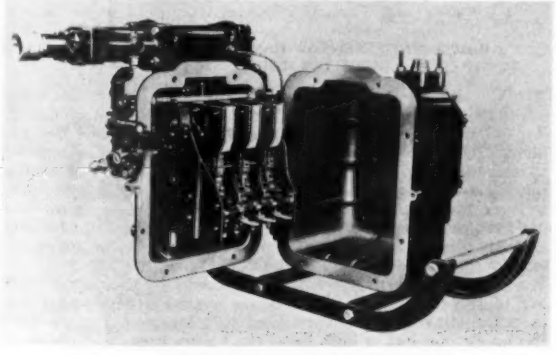
The new "Vac-Tric Popular" electric cleaner, listed at £6 12s. 6d., is a cylindrical model built on lines similar to the company's "De Luxe" machine, but a little smaller and with sled-runners. It has ball bearings, and the motor is suspended on three rubber cushions. The armature is former wound. At 10,000 r.p.m the motor develops ¼ h.p. and the suction lift is 26 to 28 in. water gauge.

The "Vac-Tric Popular" cleaner

An unusual feature for such a low-priced machine is the disinfecting device incorporated; the air is drawn through a special pad impregnated with disinfectant. The machine can be converted for use as a blower. The metal case is covered with black leatherette, and all the fittings are nickel plated. Silent operation and a twelve months' guarantee are further points of interest. The manufacturers are VAC-TRIC, LTD., Waterloo Road, North Circular Road, Cricklewood, London, N.W.2.

A "Swing-door" Gate-end Circuit Breaker

Self-isolation for maintenance, an explosion-proof enclosure without vents or flange gaps, and a two-way trailing cable plug connector are advantages possessed by the new "Type B" gate-end circuit breaker, additional to the features of the older breakers of this class produced by GEORGE ELLISON, LTD., Perry Barr, Birmingham. Certified by H.M. Mines Department as having passed the Buxton tests, its current-carrying



The new Ellison gate-end circuit breaker

capacity is 100 A, and its breaking capacity 12,000 kVA at 440 V, three-phase, 50 cycles. The circuit breaker and plug socket are mounted on the door of the enclosure, and, when the breaker is "off," the door can be unlocked and swung open and the breaker drawn out for inspection. The fixed isolator contacts at the back of the case cannot be touched accidentally. An adaptor is fitted over the isolator terminals, at the back, for connecting armoured cable by the special flameproof cable end link coupling.

A Self-priming Pump

Tests carried out by the National Physical Laboratory on a new small self-priming "G.G.G." pump, manufactured by MESSRS. GILBERT GILKES & GORDON, LTD., Kendal, are the basis of a claim that its efficiency is higher than that obtained hitherto by a non-positive pump of similar capacity and specific speed. The efficiency rises slightly with the speed, as the power lost in bearing and gland friction is approximately proportional to the speed, whereas the water horse power is nearly proportional to the third power of the speed.

The shaft, with the runner shrunk on it, is the only moving part in the pump. The port pieces and distance ring are secured in the casing when the pump is assembled; the clearance between the runner and the stationary port pieces and clearance ring is such that rubbing contact is avoided and with clear water no wear takes place. Two external ball bearings carry the shaft, dismantling can be carried out without disturbing suction and delivery piping, and the pump runner, port pieces and distance ring are made of gunmetal to avoid corrosion. End thrust is avoided and the higher the delivery head the stronger is the self-centring effect on the runner. The pump's single stage, 4½-in. diameter runner at 1,430 r.p.m. gives a head at zero discharge of 136.5 ft.

After the first filling of the pump casing with liquid the pump may be left standing for weeks ready to start up at any instant. No foot valve is required, and the water in the delivery piping can be allowed to run back, thus automatically flushing and cleaning the strainer.

A Variety of Connectors

CLANG, LTD., Crown Yard, Cricklewood, N.W.2, is a new company which produces lampholder adaptors, multi-plug sockets, iron connectors, and a domestic-appliance switch. A single-way plug bayonet lampholder has a broad milled edge finger grip, brass pins, and a copper-oxidised brass liner. Two- and three-way bayonet lampholder adaptors are all constructed of brown "Bakelite," with stippled panel reliefs, and have copper-oxidised brass liners.

Three-way plug-socket units are available with three 5-A or two 5-A and one 15-A outlets. The bodies are of brown "Bakelite" and the plugs of nickel-plated brass. There is a household iron connector with a switch and two without. The

Some "Clang" accessories

switch is of the bar type and carries "on" and "off" indications at the bar ends. It has a positive self-cleaning movement, with a quick-make and break. The body is moulded. One of the non-switch connectors is constructed of a special heat-resisting material for continuous service.

The switch mentioned is designed primarily for use with vacuum cleaners. It is of the mortise type and is constructed in a metal frame with a rectangular compound handle. There is another model with a tubular bushing and lock-nuts round the dolly for central fixing. All these accessories are designed to British standards. The company supplies adaptors, connectors and flexible leads as complete units for irons.

"Stella-Ray" Floodlights

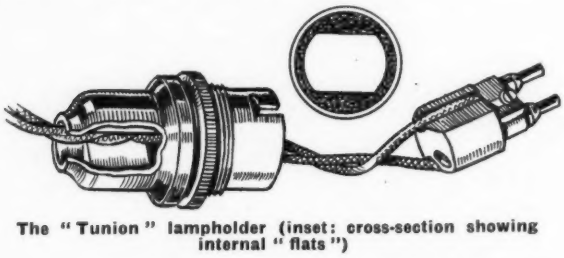
THE CENTRAL ELECTRICAL ENGINEERS' ACCESSORIES SUPPLIES, LTD., 193, Bethnal Green Road, E.2, have just introduced two floodlights. The "Perfect" model is made of heavy spun copper with a rubber gasket and washers, adjustable reflector and swing arm. The 150/200-W type with 8-in. glass reflector costs £2, and the 300/500-W

The "Perfect" and the "Square" floodlights

model costs £2 4s. A 10-in. chromium-plated metal reflector costs 3s. extra. The "Square" type, finished in sprayed gold, complete with hook and holder, costs £1 5s. An outdoor model is available fitted with a shackle. Both take 100/150-W lamps, and are mirror lined. The standard models measure 14 in. by 14 in.

Unorthodox Lampholder Construction

We recently had the opportunity of examining a specimen of the new "Tunion" lampholder. It embodies an entirely new principle of fixing, the whole of the lampholder being moulded out of "Bakelite." The plungers and terminals are fixed into a "Bakelite" base and this wedges in the dome of the holder; the greater the weight on the holder the greater is the pressure between the internal block and the dome. The cords are gripped in a separated position between the top of the solid block and the dome, so that even if the insulation were not in good condition there is no possibility of a short circuit. Owing to the one-piece construction of the holder it does not come apart when the shade ring is removed.



The "Tunion" lampholder (inset: cross-section showing internal "flats")

During tests 1 cwt. was supported by the cord grip, using 14/36 cotton flex with the terminal screws released, and after five hours' running with a 200-W gas-filled lamp with a conical shade the holder was only hand warm. The price is 4s. per dozen, and the manufacturer is MR. G. TURNOCK, 41, High Street, Aston, Birmingham. Porcelain interiors can be supplied to order at 3d. per doz. extra, and brass liners are inserted in the cylinder to give mechanical strength.

"Crypto" Refrigerator Modified

The LANCASHIRE DYNAMO & CRYPTO, LTD., 94, Petty France, Westminster, S.W.1, have now completed the 1933 model "Crypto" domestic refrigerator. The new model incorporates certain special features and modifications, which increase the efficiency of the compressor, and assure constant reliability, whilst the interior fittings as well as the general finish have been considerably improved. A large white hydrator dish with cover is included in the price, which remains the same as before (£42). In other respects the refrigerator is similar to the original model described in our issue of October 14th, 1932.

A Low-melting Point Brazing Alloy

Although the work of the brazier has been invaded during recent years in one direction by the manufacturer of seamless products and components, and by the electrical and gaseous systems of welding, the process of brazing with low-melting alloys is still used to a very great extent for joining brass, bronze, copper, nickel, nickel silver, monel metal, etc., in industries where greater strength is required than can be obtained by soft soldering, or where the metals or alloys have to withstand a degree of heat that would cause soft solder to fuse. For pure nickel and monel metal it is advisable to use brazing alloys which melt at temperatures not over 1,400 deg. F., as higher melting point brazing alloys cannot be used without danger of weakening, distorting or destroying the parts adjacent to the joint. A low-cost, low-melting point brazing alloy known as "Sil-fos" has been recently introduced in this country by MESSRS. JOHNSON MATTHEY & CO., LTD., 78, Hatton Garden, E.C.1. This new type of brazing alloy contains a small proportion of silver, and has as its chief advantage the ability to flow freely at 1,300 deg. F., unlike ordinary brazing alloys, which require from 1,500 deg. F. to 2,000 deg. F. to melt. This is even lower than silver solders containing 50 per cent. silver, which require from 1,350 to 1,500 deg. F.

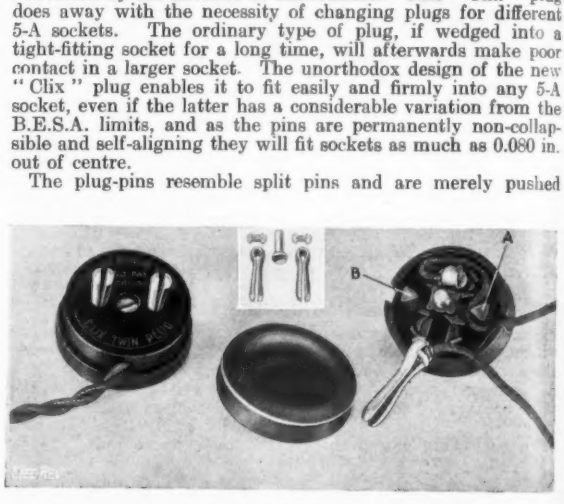
A new growler, priced at £3 17s. 6d., marketed by the Autocar Electrical Equipment Co., Ltd., 32, Albert Embankment, S.E.11

An important advantage in brazing metals with the new low melting point alloy is that it requires less than the usual amount of flux (borax, or borax and boracic acid mixtures) because of the deoxidising effect of the phosphorus in the brazing alloy. Under certain conditions copper to copper joints can be made without any flux. When this is done, care should be taken to see that the joints are absolutely clean and that a neutral or reducing flame is used. If expertly manipulated, an oxy-acetylene blowpipe may be satisfactorily used, but the flame is intense, and must be kept in motion during the brazing operation. For most electrical components, oxygen and gas, or an air-coal gas blowpipe flame will give good results. Laboratory tests on copper-to-copper lap joints made without using any flux have shown an average tensile strength of 33,000lb. per sq. in., with an elongation of 17.2 per cent. in two inches.

Self-adjusting Plugs

Last week we examined a new design of 5-A plug made by LECTRO-LINX, LTD., 79, Rochester Row, S.W.1, and were much impressed by the advance in construction. This "Clix" plug does away with the necessity of changing plugs for different 5-A sockets. The ordinary type of plug, if wedged into a tight-fitting socket for a long time, will afterwards make poor contact in a larger socket. The unorthodox design of the new "Clix" plug enables it to fit easily and firmly into any 5-A socket, even if the latter has a considerable variation from the B.E.S.A. limits, and as the pins are permanently non-collapsible and self-aligning they will fit sockets as much as 0.080 in. out of centre.

The plug-pins resemble split pins and are merely pushed



The "Clix" plug: showing the screw-retained and screw-on cover types. (Inset) The metal parts ready for assembly

into the moulded one piece "Bakelite" base, no tools being required for assembly. The flex is threaded through the "eye" which is left at the top, and the pins pushed down as far as they will go. A flat, double-headed bridge prevents the pins from going right through the base, and is designed at the same time to improve the resilience of the pins by tending to force the prongs apart. The leads are taken *via* a tortuous path around the side of the plug (as shown in the illustration), and any tension is taken up by the projection (A) in the moulding.

A second pair of wires may be taken by the same route out of the opening B. Models are available with screw tops or with non-rotating covers fixed by means of a screw from the underside, but in both cases the covers press the pins down into position. The plugs are priced at 9d. each; 3-pin types and we are informed by the makers that larger sizes will be available soon.

A Flexible-lead Support

Probably the only grumble that the user of the modern household electric iron has is that the flexible requires some attention to keep it clear of the iron in operation. A flexible-lead support recently introduced by the HOTPOINT ELECTRIC APPLIANCE CO., LTD., 24, Newman Street, W.1, should remove all such complaints.

A very flexible spiral spring normally about a foot long and capable of being extended to several feet is clamped at one end to the spring guard of the iron connector, and at the other end to a bushing supported by a short rod from a simple table clamp. The flexible lead is threaded through the bush and spring, and as the iron is moved to and fro the lead is drawn into, and discharged from the spiral, so that it cannot lie on the table. The company's main object in introducing this device is to include it as a part of the "Hotpoint" iron without any increase in the price, namely, 15s. 6d., but the support can be purchased separately at 2s. 6d.

The "Hotpoint" flex support

Domestic Exhibits on Wheels

IF electrical activity is to be carried throughout the countryside we shall have to employ means that have not been found (or considered) necessary in the past. Mobile electrical demonstration vans or exhibitions travelling from neighbourhood to neighbourhood are certainly not novel, but the earlier forms were crude compared to the equipment and facilities that are available to-day. Small undertakings sometimes lack the necessary facilities for organising exhibitions, demonstrations, and other propaganda work, but equipped travelling houses might be organised by a number of undertakings in co-operation with one another, or by E.D.A.

In this connection it is of interest to note the efforts that have been made in America to reach prospective customers in the outlying districts, by means of a motor-drawn electric kitchen, shown in the accompanying pictures. This coach, which is claimed to have proved tremendously successful in locating and securing customers for electrical domestic equipment, is admirably lighted, and provided with practically every electrical convenience for the kitchen. The appliances include, of course, electric cookers, a washer, an iron, a fan, and on the right-hand side of the interior view may be seen a refrigerator of the B.T.-H. type. The business brought in by this van has fully come up to expectations, particularly as regards refrigerators.

A travelling electric kitchen employed in the United States

It appears that in this country such travelling exhibitions might be an effective way of ascertaining whether the extension of distributors to certain areas would be justified. Needless to say there is no reason why such portable exhibits should be limited to kitchen equipment; the whole range of electrical domestic appliances would find a place, and we do not think that the scheme would be at the end of its applications there. If farmers are being approached about washers, cookers, refrigerators, &c., not to mention the need for adequate lighting in their outbuildings, why should not the opportunity be taken of "rubbing in" the benefits of electric milking, shearing, chaff cutting, &c.? It is true that a second van would be needed, with qualified salesmen, and that a lot of bulky equipment could not be carried, but at Post Office and other technical exhibitions, as well as in the South Kensington Science Museum, miniature models of apparatus and machinery prove most informative and interesting, and it should not be beyond human ingenuity to devise an exhibit accompanied by good sales literature that would bring the electrical idea home to the farmer.

A portable cinema equipment to be operated on the evening of a market day might show films comparing out-of-date farm methods with electrical ones. Vans might also be arranged to show garages and filling stations, now so numerous about the countryside, some of the benefits of electricity. Forthcoming visits would be announced to the district upon the hoardings, if available, in the local papers, by hand-bills, or even in the cinema. Letters to residents might be worth while.

The Electrical Development Association has recently been stimulating thought and interest amongst electricity supply assistants of all ages through its public speaking competitions and the necessary qualified personnel would soon be found to man the vans. Even if it were thought practicable to extend the scheme beyond the sale of domestic appliances, competent salesmen would not be lacking for other apparatus.

The co-operation of manufacturers would no doubt be readily forthcoming with regard to the supply of equipment and appliances because of the additional business that they would obtain. A certain amount of newly designed publicity matter of a particular type might be called for, but in general the customary leaflets and booklets would fit in with such campaigns.

We feel confident that a "flying squad" of electrical demonstration vans, properly equipped and adequately staffed, would do useful work in urging on rural electrical development.

The Diesel Users' Dinner

THE annual informal dinner of the Diesel Engine Users' Association was held at the Coventry Restaurant, W., on February 7th. Following the loyal toast, Mr. J. Kewley (president, Institution of Petroleum Technologists) in proposing "The Association," remarked that a Diesel engine weighing less than 3lb. per h.p. had actually driven an aeroplane. The Diesel engine was in a state of very active evolution, and there were no misgivings about its future. He predicted a greater future for it than the petrol engine had had, because of the greater availability of fuel. As the high-speed Diesel engine developed its taste for fuels would become more catholic, whereas the petrol engine needed a very special fuel. Engine manufacturers and users should co-operate more with the oil interests, an opportunity for doing so would occur at the World Oil Congress which was to be held in London this year.

Mr. C. F. Mounsdon, A.M.I.E.E., the president, replying, said that the note of optimism sounded by the proposer could be echoed by the Association, whose membership and sphere of influence were steadily increasing all over the world. The size of engine had been affected by the electricity grid. In America and Germany engines were used in connection with the grids, but in Great Britain their use in this way had been retarded by the large reserve of generating plant. Diesel-electric sets, complete with generators, were obtainable, for as little as £10 per kW.

Mr. W. A. Tookey proposed "The Guests," on whose behalf Dr. W. R. Ormandy and Mr. W. A. S. Calder replied. Mr. A. E. L. Chorlton, M.P., who also responded, thought the Association's sphere of usefulness was somewhat limited by being restricted to Diesel maters. Engineers were not taking their proper place in national affairs and no one had a wider outlook on life than they. Engineering associations and similar bodies would have to combine in order to obtain strength and power to get things done. Mr. J. G. Griffin, M.I.E.E., proposed the "Technical Press," and Mr. W. Roylands-Cooper and Mr. A. P. Chalkley replied.

German Electrical Exports

LAST year Germany's electrical exports continued the decline which has been noticeable since 1929. Electrical machinery exports were only 273,020 double centners in weight as compared with 320,586 double centners in 1931, and only 71,684,000 Rm. in value as against 88,619,000 Rm. in that year. In 1930 they were 382,750 double centners in weight. Exports of other electrical goods last year were 642,454 double centners, value 250,556,000 Rm., as compared with 1,129,414 double centners value 399,704,000 Rm. in 1931—a greater decline than in the case of machinery. In 1930 these exports were 1,235,200 double centners. Imports under both headings continued their decline. The tables below show the value (in thousands of marks), weight in double centners (equal 220 lb.) and in some instances the number of pieces, of electrical machinery and apparatus exported from Germany last year, together with the principal countries of destination. The increases or decreases as compared with 1931 are given. Exports on reparation account are included; these closed in July last.

	1932.	Inc. or Dec.
Lighting and starting apparatus for motor vehicles—		
Value	6,030	+ 1,125
Weight (double centner)	10,060	+ 2,388
Number	90,760	+ 9,795
Dynamos, motors, converiors and transformers up to 5 double centner—*		
Value	18,580	— 10,890
Number	597,070	— 188,480
Weight (double centner)	49,740	— 24,280
Dynamos, motors, converiors and transformers from 5 to 30 double centner†—		
Value	12,140	— 4,480
Number	4,620	— 1,800
Weight (double centner)	50,410	— 19,620
Dynamos, motors, converiors and transformers over 30 double centner‡—		
Value	28,910	+ 1,155
Number	1,060	— 940
Weight (double centner)	144,175	— 5
Armatures and commutators—		
Value	6,030	— 3,850
Weight (double centner)	18,640	— 6,050
Accumulators, plates, etc.—		
Value	7,384	+ 2,224
Weight (double centner)	41,100	— 120
To Denmark	1,510	— 1,490
„ Holland	14,200	+ 6,570
„ Sweden	7,600	— 6,980
„ Argentina	2,300	+ 170
„ Soviet Russia	3,990	+ 3,550
Cable—		
Value	13,250	— 28,060
Weight (double centner)	200,010	— 301,670
To Holland	70,940	— 77,320
„ Denmark	3,030	— 21,510
„ Sweden	13,510	— 15,430
„ Soviet Russia	6,290	— 9,800
„ Argentina	21,310	— 69,660
„ Uruguay	5,330	— 15,450
„ Great Britain	4,530	— 16,940
„ Irish Free State	9,310	+ 4,970
Conduit tubes of paper or cardboard—		
Value	1,300	— 1,130
Weight (double centner)	24,200	— 8,000

	1932.	Inc. or Dec.
Measuring and recording instruments—		
Value	26,030	— 8,560
Weight (double centner)	18,800	— 6,230
To Holland	1,870	— 1,260
„ Great Britain	1,790	— 390
„ Belgium	900	— 290
„ Italy	930	— 500
„ Sweden	1,430	— 380
„ Argentina	800	— 370
„ Soviet Russia	3,630	+ 810
Electric irons—		
Value	820	— 820
Heating and cooking apparatus—		
Value	7,540	— 3,900
Metal filament lamps—		
Value	11,510	— 10,100
Hundreds	408,000	— 195,840
To Belgium	21,440	— 3,310
„ Denmark	27,990	— 11,580
„ Poland	8,090	— 5,310
„ France	67,200	— 8,650
„ Great Britain	37,060	— 32,040
„ Italy	29,820	— 10,360
„ Holland	13,510	— 10,010
„ Austria	15,800	— 7,400
„ Sweden	20,230	— 9,130
„ Switzerland	21,720	+ 20
„ Czechoslovakia	16,640	— 20,450
„ China	10,410	— 15,100
Telephone material—		
Value	19,260	— 3,100
Weight (double centner)	12,550	— 8,090
To Belgium	250	— 740
„ France	910	— 30
„ Italy	2,150	— 1,620
„ Holland	2,000	— 1,230
„ Austria	380	— 1,080
„ Sweden	1,140	+ 240
Wireless material—		
Value	44,290	— 33,930
Weight (double centner)	49,390	— 31,640
To Belgium	5,150	+ 390
„ Denmark	740	— 2,320
„ Poland	210	— 870
„ Finland	1,410	— 20
„ France	7,150	+ 670
„ Great Britain	2,600	— 22,590
„ Italy	400	— 990
„ Holland	9,380	+ 2,810
„ Norway	1,310	— 500
„ Sweden	3,740	— 2,500
„ Switzerland	6,470	+ 1,280
„ Czechoslovakia	1,920	— 1,260

	1932.	Inc. or Dec.
Ignition apparatus, etc., and parts (excl. magnetos) and elec. accessories for motor vehicles—		
Value	14,030	— 2,320
Weight (double centner)	15,820	— 2,190
To Denmark	340	— 1,070
„ France	1,760	+ 60
„ Great Britain	670	— 700
„ Italy	2,220	+ 540
„ Soviet Russia	2,290	+ 1,380
„ United States	1,180	— 160
Safety and signalling apparatus—		
Value	6,070	— 2,120
Weight (double centner)	8,010	— 3,660
To Great Britain	1,450	— 2,120
„ Holland	1,190	— 360
„ Switzerland	1,080	— 220
Apparatus for lighting, power transmission, electrolysis, resistances, etc.—		
Value	78,350	— 30,850
Weight (double centner)	208,150	— 67,170
To Great Britain	7,530	— 13,410
„ France	12,240	— 6,630
„ Holland	24,190	— 9,880
„ Soviet Russia	53,100	+ 18,940
Galvanic batteries and parts and heating elements—		
Value	3,880	— 5,540
Weight (double centner)	25,550	— 28,520
To Great Britain	9,150	— 18,070
„ Sweden	4,680	— 1,810
„ India	2,600	— 2,620
Telegraph or telephone insulators—		
Value	2,360	— 3,270
Weight (double centner)	23,860	— 32,840
Electro-medical and dental apparatus—		
Value	9,900	— 6,810
Insulating material of asbestos, mica and micanite—		
Value	320	— 120
Weight (double centner)	290	— 120

Principal countries of destination in 1932 (double centners)—* Soviet Russia, 10,140; Holland, 4,130; † Soviet Russia, 27,400; France, 3,500; ‡ Soviet Russia, 83,260; France, 31,360.

In the Courts

IN the Chancery Division last week Mr. Justice Farwell delivered judgment in the case of the Prudential Assurance Co., Ltd., against the Adelaide Electric Supply Co., Ltd. The plaintiffs, as the holders of £11,000 5 per cent. "A" cumulative preference stock and £30,000 6½ cumulative preference stock of the defendant company on behalf of themselves and all other holders on the English register of the defendant company of those stocks, asked for a declaration that they were entitled to be paid their dividends in full in sterling and in England and not in Australian currency or its equivalent.

His Lordship upheld the plaintiffs' contention and granted the declaration for which they asked.

An Electric Wringer Accident

In the King's Bench Division on February 2nd, before Mr. Justice Avory and a special jury, Mr. A. C. Turner and his wife, Mrs. M. Turner, of Kingston-on-Thames, claimed damages from the Edison Swan Electric Co., Ltd., for alleged breach of warranty and negligence in connection with an electric washer and wringer. The plaintiffs stated that in February, 1930, one of the defendants' representatives demonstrated the working of a "Thor" machine and in the course of the demonstration represented that the rollers were quite harmless and that if the fingers of the operator were caught it did not matter as all one had to do was to loosen a screw at the top of the machine which had the effect of releasing the rollers.

Mrs. Turner alleged that in March, 1930, the fingers of her right hand were suddenly caught in the rollers and drawn through and as it was impossible for her to loosen the screw or draw her hand out her hand was very severely crushed.

The defendants denied that their demonstrator had warranted that it did not matter if the operator's fingers were caught in the rollers. On the other hand they alleged that their demonstrator had expressly instructed Mrs. Turner that in feeding clothes to the wringer she should only use one hand and be careful to keep the back of her hand, which was feeding the clothes, turned towards the rollers in order to prevent any risk of her fingers being caught in the wringer. The defendants also denied that the instruction or statements of the demonstrator amounted to warranties.

Both the plaintiffs having given evidence, evidence was given on February 3rd for the defendants by Miss C. M. Duck, a demonstrator formerly in the employ of the defendants. She said that she told Mrs. Turner that the screw on the top of the machine altered the tension of the rollers and witness also showed her how to hold the clothes when feeding the machine, so that it was impossible to catch the fingers in the rollers. Witness denied that she told Mrs. Turner that the motor should be running when the wringer was put on.

In summing up the case to the jury his Lordship said that before Mrs. Turner could succeed in the action it was necessary for her to prove that her injury was caused by the defendants' negligence. The evidence was that because Mrs. Turner wanted to make some alteration in the position of the wringer she turned away to switch off the current and put her hand in between the rollers. Was that the fault of the defendants and due to their negligence?

Without leaving the box the jury returned a verdict for the defendants, for whom judgment was entered with costs.

A Price-cutting Injunction

In the Chancery Division on February 3rd Mr. Justice Bennett granted by consent an injunction to E. K. Cole, Ltd., manufacturers of wireless sets and accessories, restraining Mr. C. R. Gallagher, trading as the Windmill Radio Stores, Gravesend, from selling their d.c. eliminators under the list price.

The defendant, who appeared in person, said he had apologised and promised not to sell the plaintiff company's eliminators except in accordance with the list prices. He was willing to consent to the injunction asked for, but being only in a small way of business he could not afford to pay costs.

Mr. Nesbitt, for the plaintiffs, said that in the circumstances they would waive any question of costs.

The Work of Committee D

THERE was a gathering of about 350 members and guests at the annual dinner of the Electrical Wholesalers' Federation at the Savoy on February 2nd. Councillor J. W. Dodds, president, occupied the chair, and the first speaker was the Earl of Verulam (chairman, Enfield Cable Works, Ltd.), who proposed the toast of the Federation.

In the course of his speech Lord Verulam said that the wholesalers formed a useful link between manufacturers and retailers, and he had a great admiration for their work. He pointed out that since 1900 there had been a redistribution of wealth; the poor had acquired greater purchasing power and the rich had become poorer. Therefore distributors should seek to increase the volume of their trade with a smaller margin of profit.

The Ottawa agreements would prove a great success if they did not raise prices above the world level. While a tariff was desirable for this country it must remain low, in spite of the manufacturers' clamour; otherwise prices would rise, competition would be weakened, and lethargy and inefficiency would result. The solution of the world's present difficulties lay in the disposal of an ever-expanding volume of goods, but retail prices had not fallen so much as might have been expected.

Committee D had laboured for seven years without result—this was about the rate of progress he had learned to expect within the ambit of the electrical industry. To ask when a report would appear from the Committee was one of those things which "simply were not done."

About a hundred years ago, just before the commencement of a period of unparalleled prosperity, eminent men were prophesying impending disaster; might not the present time be the beginning of a new era?

A Colossal Task

Responding to the toast, the president said that the E.W.F. was once the unwanted child of the industry, but by its usefulness it had become a respected member of the family. The electrical wholesalers claimed to provide the easiest and cheapest means of distribution, as those manufacturers who had worked with them had discovered. The Federation had seventy-six members serving the manufacturer and the contractor in all parts of the country. The contractor and wholesaler would have to stand together to show a united front to aggressive monopolists.

Mr. A. G. Beaver proposed the toast "Kindred Associations," and made a survey of the many bodies represented; he mentioned incidentally that Mr. D. N. Dunlop (B.E.A.M.A.) was too ill to attend the dinner. Mr. Beaver said that critics of Committee D had no idea of the difficulties which lay in the way of a solution equitable and satisfactory to all the parties concerned; the matter was almost beyond the scope of human endeavour. If ever an acceptable fair trading policy was evolved most of the credit would be due to Mr. F. W. Purse, the chairman of the Committee.

The trade user had been defined as one who employed an electrical staff; the difficulty was to get the definition accepted. A short time ago Draft No. 6 had been sent out by the Committee, but the I.M.E.A. and power companies' representatives, while expressing their approval of the aims of the Committee, were unable to become signatories. They were now working upon Draft No. 8.

Other manufacturing industries were able to formulate schemes of protection, why could not the electrical industry do the same? He asked the various sections to give their sincere consideration to the ultimate findings of the Committee when they became available, and he assured them that any reasonable suggestions for amendment would be welcomed.

How It All Arose

Mr. F. W. Purse, replying to the toast, reviewed the history of Committee D. The 1926 Act, he said, did not deal entirely with the grid; it raised the question of the future relationship between supply authorities and contractors. The municipal authorities were given full trading powers and a conference was set up to discuss how these should be employed. As a result three committees were formed: A, the "basis committee"; B, the prices and terms committee, and C, a committee to deal with the representations of the Scottish section. After the various matters had been discussed and Clause 48 had been included in the Act the Scottish representatives brought forward a "fair trading agreement," and subsequently, in 1927, this matter was referred to Committee D—a fair trading committee. The first meeting was held on July 20th, 1927, with Mr. J. Y. Fletcher, of the G.E.C., as chairman. He (Mr. Purse) became chairman in October, 1929.

The Committee viewed price-cutting and the wrongful granting of discounts as disastrous to the whole industry. He held that it was particularly disastrous that the supply authorities (who formed the most prosperous section of the industry), should seek to force manufacturers, wholesalers and contractors to supply goods at sweated prices while they made big profits from the sale of high-priced energy. Referring to the I.M.E.A.'s part in the 1926 Act, he said that Mr. R. W. L. Phillips and himself were responsible for the drafting of Clause 48 with the aid of the contractors' representatives. The municipalities only wanted the opportunity of fighting their gas competitors by means of showrooms, &c., and they were anxious to work with the contractors. Clause 48 was a legal agreement, but there was also a "gentlemen's agreement" which he hoped the I.M.E.A. would not break. If the whole industry followed the wholesalers' example and composed their differences they would go forward at a much greater pace than was the case at present.

A National Convention

Mr. Purse said that the electrical Press had recently advocated a great national electrical convention and exhibition, but it had received a very cold reception. The I.M.E.A., E.C.A., and the I.E.E. would still go on with their separate meetings. What a wonderful opportunity they were neglecting!

In conclusion, the speaker said he hoped that within the next month or two Committee D would be able to ask the various associations to subscribe to a fair trading policy which should commend itself to them all. He asked them to consider it as a basis for working on and improving. If this were done it might mean the inauguration of a new era.

The chairman's health was proposed by Mr. D. Foster, vice-president, and Mr. Dodds replied.

During the evening Mr. Flotsam and Mr. Jetsam, with Billy Gainsborough's Band, and Mr. Arthur Askey, provided musical entertainment.

The recently installed lighting system at the Auckland (N.Z.) railway station is of a most ornate nature. The fittings were designed by Messrs. Gummer & Ford, and the lamps and cables were supplied by the British General Electric Co., Ltd.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Is the Worst Over?

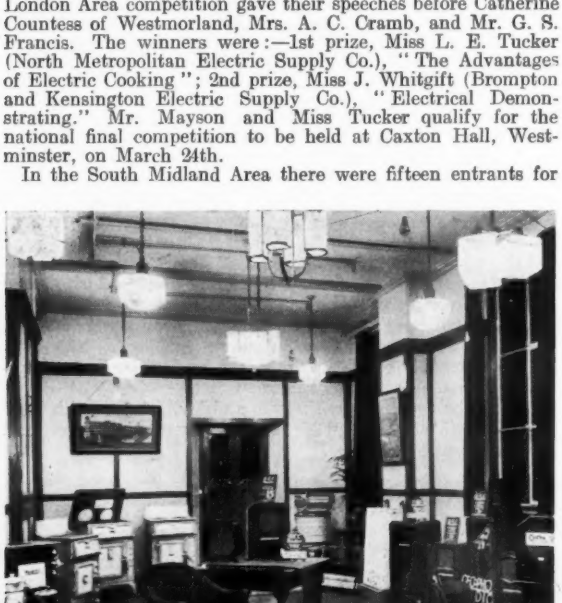
According to the business forecast contained in the January issue of the quarterly *Business Barometer* of the Federation of British Industries, there is a general impression both in this country and America that the worst of the trade depression is over. This may quite easily be true as the additional setback in prices last year, as compared with 1931, was primarily due to the financial crisis of the previous year; and, if we may assume that there will be no further major crises, then the lowest point of the depression has been passed. But even if the outlook in finance were sufficiently clear to rule out the possibility of a further major financial breakdown, recovery must be a very slow and fitful process. A condition of what may be termed "concealed inflation" exists in many countries at the present time, which may at any moment break out into open inflation; this may give rise to unjustifiable optimism, leading to a reaction later. No permanent recovery can be brought about by monetary means until production is brought into proper relation with consumption, and this is likely to be easier to achieve inside limited areas, protected from external interference, than by international action.

The E.D.A. Public Speaking Competition

Insufficient entries were received in the South-Midland Area and Scotland to justify ladies' competitions for these areas, but it is hoped that the competition will be repeated next winter. The competition finals in the London and South-East England Area were held on February 1st and 3rd at the E.D.A. offices. The men's final, on February 1st, was judged by Mr. F. Webster, B.A., Mr. Wilfred Randell, and Mr. G. S. Francis. The winners and their subjects were as follows:—1st prize, Mr. C. F. Mayson (General Electric Co., Ltd.), "Electricity as a Heating Agent"; 2nd prize, Mr. E. J. A. Leroy (Brompton and Kensington Electric Supply Co., Ltd.), "The Everyday Use of Electricity."

On February 3rd the seven ladies who had entered for the London Area competition gave their speeches before Catherine Countess of Westmorland, Mrs. A. C. Cramb, and Mr. G. S. Francis. The winners were:—1st prize, Miss L. E. Tucker (North Metropolitan Electric Supply Co.), "The Advantages of Electric Cooking"; 2nd prize, Miss J. Whitgift (Brompton and Kensington Electric Supply Co.), "Electrical Demonstrating." Mr. Mayson and Miss Tucker qualify for the national final competition to be held at Caxton Hall, Westminster, on March 24th.

In the South Midland Area there were fifteen entrants for the men's competition held on January 30th at the Birmingham Electric Supply Department offices, when the judges were Councillor H. Archer, Councillor H. K. Beale, and Mr. F. Forrest. The following awards were made:—1st prize, Mr. R. H. Phillips (General Electric Co., Ltd.); 2nd prize Mr. E. T. Barton (Electric Supply Co., Walsall). In Scotland the fifteen men who had entered were judged during the evenings of January 31st and February 1st by Professor G. W. O. Howe, Mr. J. D. Mitchell, and Mr. T. Catten. The prize-winners were:—1st prize, Mr. R. F. Jennison, "Can We Afford the Non-Ring Lamp?"; 2nd prize, Mr. D. McDougall, "Bottled Sunshine." The men's competition for the Northern Counties Area was held on January 31st at Carliol House, Newcastle, the judges being Councillor William Temple, who deputised for the Lord Mayor of Newcastle, Mr. A. S. Tong, and Mr. R. H. Davison. The awards were as follows:—1st prize, Mr. W. Henderson (North Eastern Electric Supply Co.), "Electricity and the Home"; 2nd prize, Mr. F. Thornton (Edgar Phillips, Ltd.), "Domestic Appliances and their Development." The ladies' competition was held at Carliol House on January 30th, prizes being awarded to Miss E. Clapham (North Eastern Electric Supply Co.), "Jottings from my Notebook"; and Miss A. L. Cook (North Eastern Electric Supply Co.), "Electricity in the Home is an Economic Proposition."



The new G.E.C. wholesale showrooms at Ipswich (see p. 189)

Registered Electrical Contractors

Applications for registration from the following were accepted by the Executive Committee of the National Register of Electrical Installation Contractors at its last meeting:—

Tomlins, Ltd., Tunstall, Staffs.
Leyland, B. F., & Co., Liverpool.
Carlen, L., Fairfield, Liverpool.
Moran, E. H., Moss Side, Manchester.
Forrester, B., Manchester.
Gilmour, J. K., Levenshulme, Manchester.
Sellers, W. H., Stockport.
Phillips & Dart, Ltd., Worthing.

At the same meeting two applications were withdrawn and twelve were declined.

Finnish Tariff Alterations

Under a revised tariff on goods imported into Finland the duty on electrical machinery of not more than 250 kilogs. in weight has been increased from 6 to 10 marks per kilog. and for between 250 and 500 kilogs. from 6 to 7 marks per kilog. The tariff on electric cooking apparatus is now 10 marks per kilog. instead of 4 marks.

Imperial Preference

A Board of Trade announcement states that new regulations which will come into force on April 1st next provide that certain classes of goods imported from the Empire must contain a minimum of 50 per cent. of Empire material and labour in order to qualify for Imperial Preference instead of 25 per cent. as at present. The items affected include insulated wires and cables, telegraph and telephone apparatus, wireless apparatus and valves, electric carbons, lighting appliances and fittings, batteries and accumulators, bell apparatus, electric cooking and heating apparatus, meters, and measuring instruments.

The Ideal Home Exhibition

The *Daily Mail* Ideal Home Exhibition will be opened at Olympia, London, on March 29th by Mrs. Stanley Baldwin, and will continue until April 29th.

Bolton Electrical Fittings Department's Sales

Bolton Corporation Electricity Committee has decided to take no action with reference to the representations made to it by the Manchester Area Branch of the Electrical Contractors' Association and the Electrical Contractors' Section of the Bolton Chamber of Trade with regard to prices charged by the Electricity Fittings Department for fixed price proprietary articles.

Swiss Lamp Duties

The Swiss import duties on electric lamps and lustres (other than electric arc and incandescent lamps) and parts, including lamp sockets, have been revised according to composition as follows:—Iron, 200 frs. per 100 kilogs.; other common metals and wood, 300 frs. per 100 kilogs.; other materials, 100 frs. per 100 kilogs. Previously the duty was 70 frs. per 100 kilogs. for all classes.

Recent Contracts

Messrs. Siemens Bros. & Co., Ltd., have received instructions from the British Tanker Co., Ltd., to equip on hire and maintenance contracts thirty ships with wireless direction finders and forty-eight ships with auto-alarm devices. The direction finders will have single rotating loop frame-aerials and four-valve receivers. The equipments are simple to operate, yet give good ranges, the bearings being sharp and accurate. "Sense" determination is definite and easily ascertained. The auto-alarms are being provided to meet the requirements of the Convention for the Safety of Life at Sea as embodied in the latest Government rules. An interesting feature of the Siemens auto-alarm is the selector in which the time analysis of the signals received is purely electrical. It has been developed in the company's telephone engineering research department at Woolwich. An auto-alarm, although complying with regulations, confers no direct benefit on the ship on which it is fitted unless it has the "transmit feature." The normal process of this electrical selector can be reversed to provide a device for keying the circuit of the ship's wireless station. The alarm signal is then sent out entirely automatically and accurately. This is of great benefit in times of distress, and should

it be necessary to abandon the ship, the alarm signal will continue to be sent out until the battery power is exhausted or the apparatus is in some way damaged.

Venreco, Ltd., has secured an order for stage-lighting equipment in the Empire Theatre, Paris. The apparatus includes battens and a switchboard and dimmer bank. There are forty-two dimmers in all arranged for individual and master control on each tier by means of self-release clutches. Each tier of dimmers is also arranged for grand master control so that it is possible to operate any dimmers individually or collectively and so that any tier can be taken up at the same time that any other tier is being taken down. The whole of the equipment was manufactured, packed and despatched within

Baldock Church, which has recently been equipped with concealed Benjamin "Intensolux" reflectors giving 4 foot-candles in the nave and 7 foot-candles in the chancel

ten days of receipt of the order. Mr. Veness, the managing director of the company, is in Paris supervising the erection of the equipment.

A contract for the construction of a complete Diesel-electric express train has been placed with Sir W. G. Armstrong Whitworth & Co. (Engineers), Ltd. The train, which has been ordered by the San Paulo Railway of Brazil, is to run at express timings between San Paulo and the harbour of Santos. South America is now leading the world in its demand for British oil-electric railway units. One city has decided to run some of its suburban services with oil-electric trains. The power units of three of these are to be shipped from England this month by Messrs. Armstrong Whitworth.

The Edinburgh firm of Messrs. A. M. Carmichael has secured the contract for the construction of the Glenlee power station in connection with the £3,000,000 Galloway water-power scheme. The contract amounts to almost £25,000, and covers the construction of the foundations, steel work, and roofs of the power house and switch house. The firm has already completed the tunnel which will bring the water to Glenlee from Clatteringshaws. The Glenlee station, which will work under a 350 ft. head of water from the Clatteringshaws dam four miles away, will be equipped with two 12,000-kW generating sets. The consulting engineers for the scheme are Sir Alexander Gibb & Partners.

Norwegian Vacuum Cleaner Duties

As from January 1st last an import duty of 18 per cent. has been imposed on electric vacuum cleaners imported into Norway. Hitherto such goods have been allowed into the country free of duty.

French Electrical Imports and Exports

The official returns show that during the nine months ended with September last, the imports of electrical machinery, apparatus and cognate material into France reached a total value of £3,799,300, as compared with £5,604,680 in the corresponding nine months of 1931. During the same period there was also a falling off in the exports of similar material—from £1,000,580 to £2,382,430.

New Australian Companies

New companies registered recently in Australia include Chesleigh's Pty., Ltd. (capital £5,000) to acquire the radio and electrical business carried on by A. C. Chesleigh; the Miniature Electric Co. Pty., Ltd. (£20,000); and Del Cott Pty., Ltd. (capital £10,000), electrical and engineering apparatus manufacturers and dealers.

Social Events

The nineteenth annual staff dinner of Messrs. Ferranti, Ltd., was held in Manchester on February 3rd. Amongst the guests were representatives of electricity supply undertakings and leading members of the radio and clock industries. Mr. V. Z. de Ferranti, who presided, read a cable of greeting from Mrs. Ferranti, who is now travelling in Egypt. Mr. Ferranti stated that since their last staff dinner the works had been equipped to deal with a lot more business, and, indeed, they had been fortunate in getting it. As a result they had employed during the year a record number of people. They could not immediately see themselves continuing at the rate of progress to which they had become accustomed. Work for the grid was finished. The immediate future was not altogether bright, but, looking ahead just a little farther, he thought there were extremely bright prospects. The Central Electricity Board realised that it had to get on with its job, and the Ferranti works to some extent depended upon its doing that.

Mr. Denis Z. de Ferranti said that they had applied themselves to effecting technical improvements in their radio products, and in the production of valves the company was in a very strong position for meeting the coming season's demand. The contracts for transformers and meters required for the grid schemes having come to an end, the attention of the company must now be devoted to such things as would follow—clocks, fires, appliances, &c. Mr. H. C. Lamb, city electrical engineer, Manchester, Major Cooper (director), Mr. J. W. Davies, and Ald. E. Bardsley (Mayor of Oldham) also spoke.

On February 3rd the Metrovick Publicity Department held a "revel" at the King's Hall, Stretford. Everything was arranged very attractively and the committee is to be heartily congratulated on the success of its efforts.

Trade Announcements

Britannia Batteries, Ltd., have found it necessary to provide their Glasgow depôt with more commodious premises at 88-90, York Street.

Messrs. Wm. Sanders & Co. are now represented in Westmorland, Lancashire, Cheshire and North Wales by Mr. E. Golland, "Mardale," Kingsway, Heswall, Wirral, Cheshire.

The representation in Yorkshire of Messrs. Edward G. Herbert, Ltd., Levenshulme, Manchester, has been taken over by Mr. Alan Kiernan, A.M.I.Mech.E., working from the company's head office, in place of Mr. B. D. Eagin, Leeds.

Messrs. A. Baird & Sons, High Street, Annan, have opened new showroom premises for the electrical department of their business.

Conditions in Italy

In a Department of Overseas Trade report on economic conditions in Italy up to September last, it is remarked that the main feature during the past year has been the severe shrinkage of both exports and imports and of internal trade, with consequent budgetary and financial difficulties. The effects of the "economic blizzard" have not been so catastrophic in Italy as in the majority of countries. With regard to the importation of electric generators and motors it is stated that in 1931 the total imports amounted to 1,444 tons, of which Germany's share was 831 tons, Sweden's 145 tons, and the United Kingdom's 74 tons.

The Timber Market

Consumption of European timber has shown improvement during the past month. There are good reasons for optimism, for the building trade shows signs of revival, new contracts, especially for housing, being much larger than a year ago. The hardwood trade continues slow, and business in American woods is hampered by the high dollar rate. Mahogany and teak are still little in demand, but the outlook is much more hopeful.

For Sale

Manchester Electricity Department has for sale d.c. substation plant. (See our classified advertisements.)

Electricity on the Hoardings

The accompanying picture shows a 32-sheet poster display on the hoardings surrounding the new Manchester Central Reference Library. In this instance the 16-sheet E.D.A. poster was used to draw attention to an electric cookery exhibition.

A large electrical poster in Manchester

Mr. H. C. Lamb, the city electrical engineer, tells us that the Manchester Corporation Electricity Department's enterprise has been amply rewarded by the number of callers and inquiries at the exhibition.

Municipal Trading at Darlington

At a meeting of the Darlington Chamber of Trade last week reference was made to the recent protest by the Chamber against the sales activities of the Corporation electricity showrooms. Mr. Robert Hughes (chairman), reporting on an interview between the representatives of the electrical traders and the Corporation, said that the Electricity Committee offered to

enter the name of any customer against the name of any regular trader mentioned by the customer, and thus the trader would get the profit on the transaction. The manager said the showrooms were carrying the private traders' stock; but the deputation pointed out that the traders preferred to carry their own stock and to deal with their own customers. Electrical fittings were being sold on terms with which the private trader could not compete. Mr. James Paterson, electrical goods dealer, supported the statement, and on his proposal the whole question is to be referred to the Federated Chambers of Trade.

Insulation Samples

Messrs. Birkbys, Ltd., Liversedge, Yorks, have sent us a very neat display box (illustrated herewith) produced in their "Elo" synthetic resin. This is partitioned and contains a full

A neat display box

range of sample discs of "Elo" in plain, variegated and wood colours. The box was accompanied by another good example of an "Elo" moulding—a fishing reel.

A 24-hour "Bestobell" Service

In order that any industrial concerns may be able to obtain immediate attention in the event of a breakdown or through a shortage of "Bestobell" materials, Messrs. Bell's Asbestos & Engineering Supplies, Ltd., is to maintain a day and night service, Sundays and Bank Holidays included. A combined map and leaflet has been prepared giving details of the new scheme.

Shell-Mex House

We regret that in our description of the electrical installation in Shell-Mex House, London, in our last issue we omitted to mention that the consulting engineer responsible for the layout of the installation was Mr. W. T. Parr, of the St. Helens Estates, Ltd. The lighting methods and fittings were specially designed by the architects, Messrs. Joseph. Messrs. F. H. Wheeler, of Victoria Street, were the contractors for the whole of the wiring installation for the lighting, heating, power, bells, and electric clocks, as well as for the wiring in connection with the hot-water apparatus and all other current-consuming devices.

Messrs. L. Weekes (Luton), Ltd., point out that the switch-fuses which they supplied for the building were of their "Safetee" (not "Safette") standard air-break patterns.

Prices of Materials

Messrs. F. Smith report, February 8th: Electrolytic copper bars and sheets, no change. Electrolytic copper wire rods, £38, £3 dec. Electrolytic copper h.c. wire, 6$\frac{5}{8}$d., $\frac{1}{4}$d. dec. Silicium bronze wire, 7$\frac{3}{4}$d., $\frac{1}{4}$d. dec.

Messrs. Edward Till & Co. report, February 8th: India-rubber, Para fine, 4$\frac{1}{4}$d., $\frac{1}{2}$d. dec.

Messrs. James & Shakespeare report, February 8th: No change in the prices of copper bars (best selected), sheet and rod, and English pig lead.

Changes of Name

The Wigmore Radio Service, Ltd., has changed its name to Peter Maurice Radio, Ltd.

The Electric Power Finance Corporation, Ltd., has altered its title to Electric Power and General Finance Corporation, Ltd.

New Catalogues and Lists

Synchromatic Time Recording Co., Ltd., 47, South Castle Street, Liverpool.—An illustrated folder describing synchronous electric clocks

Findlay & Co., Broadway Chambers, Hammersmith, W.6.—Catalogue No. 1 dealing with stop watches, chronographs, &c., for laboratory and industrial work, &c.

Metropolitan-Vickers Electrical Co., Ltd., Manchester.—Three leaflets on parallel feeder protection differential relays.

B. & F. Carter & Co., Ltd., Rochdale.—Leaflets giving particulars of the company's improved high speed slide plate type horizontal wire braiding machines and combined wire coiling and hose armouring machines.

Kirkstall Forge, Ltd., near Leeds.—A 78-page illustrated booklet describing the company's rolling mills and steel bar products.

British Insulated Cables, Ltd., Prescot, Lancs.—An 84-page catalogue (No. C.2.M.) on overhead equipment for tramways and railless traction. Also publications Nos. P.272 and P.F.105, relating respectively to "Rockbestos" insulated arc light and projector cable, and ironclad service cut-outs.

Aurora Lamps, Ltd., Old Kilpatrick, Dumbartonshire.—A coloured folder giving details of "Aurora" electric lamps.

Wm. Sanders & Co., Wednesbury.—A leaflet illustrating a neat type of switch-fuse.

Lissen, Ltd., Lissenium Works, Worple Road, Isleworth, Middlesex.—A descriptive leaflet relating to a new universal four wave-range coil.

Philips Lamps, Ltd., 145, Charing Cross Road, W.C.2.—Coloured folders pointing out the merits of the type "830-B" battery-operated radio receiver.

Elliott Brothers (London), Ltd., Century Works, Lewisham, S.E.13.—Catalogue sheets Nos. A.77-80 and B.141-141 illustrating and describing the company's "miniature series" instruments, comprising moving coil, moving iron, thermal and metal rectifier types for a.c. and d.c. measurement. Also a leaflet on vacuum thermo-couples.

Engineering & Lighting Equipment Co., Ltd., Sphere Works, St. Albans, Herts.—Catalogue No. 12, a stiff-covered publication of seventy-two pages dealing with street and industrial lighting fittings equipment.

Radiovisor Parent, Ltd., 28, Little Russell Street, W.C.1.—A folder indicating the various uses of "Radiovisor" light-sensitive apparatus.

Jackson Electric Stove Co., Ltd., 143, Sloane Street, S.W.1.—A calendar-blotter for February illustrating the "91-J" cooking cabinet.

British Electric Domestic Appliances, Ltd., 3, Hanover Court, Moor Lane, E.C.2.—The January and February issues of the "Mary-Ann News," a new publication in which particulars of the company's advertising campaign are given.

Northern Steel & Hardware Co., Ltd., 1 & 3, Southgate, Deansgate, Manchester.—A leaflet describing the "Northern De Luxe" vacuum cleaner. Also an abridged list (No. 11) of electrical and wireless sundries.

Steel Barrel Co. (of Uxbridge), Ltd., Phœnix Wharf, Uxbridge.—An illustrated pamphlet describing the company's activities and progress in fabricated steel work.

L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, W.C.2.—Leaflet illustrating and describing the "Mirophar Brot" electric toilet mirrors, and commercial lighting units. Also the February issue of the "Link."

Electric Depôt, Ltd., Pritchett Street, Aston, Birmingham.—A leaflet showing adjustable brackets for lamps, &c.

Phœnix Telephone & Electric Works, Ltd., 38, Newman Street, and 2, Upper Rathbone Place, W.1.—Publication No. 106 relating to "Phœmax" mains-operated intercommunication telephones.

Santon, Ltd., Somerton Works, Newport, Mon.—Revised leaflets describing thermal storage heaters, instantaneous type geysers, and cylinder belts. Geyser prices have been considerably reduced.

Premier Gas Engine Co., Ltd., Sandiacre, Nottingham.—A leaflet on the use of "Crossley Premier" heavy-oil engines for the Diesel-electric propulsion of ferries.

Bankruptcy Proceedings

L. A. Whitby, electric lighting specialist, 67, Buckingham Gate, S.W.—This debtor attended last week at the London Bankruptcy Court for public examination upon accounts showing liabilities of £1,084 and assets of £10. Replying to Mr. J. Vyvyan, the Official Receiver, the debtor stated that in August, 1931, he and another person started to trade as electric lighting specialists under the title "The Westminster Fittings Co." It was proposed to form a limited company to take over the concern, but that was not done, and it was agreed that his partner's interest should be limited to 50 per cent. of the net profits. The profits did not cover overhead expenses and these bankruptcy proceedings were instituted by the landlord. The debtor attributed his failure and insolvency to depreciation in value of property, loss on the trading, and liability under a guarantee. The examination was concluded.

S. J. Garrod, electrical engineer, 181, St. John Street, E.C., trading as the Electrical Repair & Manufacturing Co.—The first meeting of creditors was held recently when a statement of affairs was presented showing liabilities of £1,867 against assets of £903. The debtor states that he began business in June, 1920, with a capital of £50, and in 1930 entered into partnership with another person, trading at 30, Clerkenwell Close, E.C., under the style of C. J. Staples & Co. The partnership was dissolved early in 1932, he (debtor) taking over the assets and liabilities and continuing the business as the Yarwood Manufacturing Co. He financed the latter concern out of the Electrical Repair & Manufacturing Company's business, and estimates his loss in connection with it at £1,050 to which loss he attributes his failure and insolvency. Mr. W. A. J. Osborne was elected trustee to wind up the estate. The following are the principal creditors:—Edison Swan Electric Co., Ltd., £111; Falk, Stadelmann & Co., Ltd., £329; General Electric Co., Ltd., £118; Leboff, £157; Morrells, £54; Sun Electrical Co., Ltd., £241; E. Schlenker, £70; Venesta, Ltd., £144.

R. T. Styles (trading as Styles Radio), radio dealer, 132, Somers Road, Southsea, Hants.—The receiving order was made on a creditor's petition recently. The first meeting of creditors was held at the Official Receiver's Office, 87, High Street, Portsmouth, when a statement of affairs was submitted which disclosed liabilities amounting to £1,343, against assets of £197. The following are creditors:—J. J. Eastick & Sons, £150; Flinders (Wholesale), Ltd., £597; Marconiphone Co., Ltd., £181.

E. S. N. Rees, wireless dealer, 4, High Street, Llanhilleth, Monmouthshire.—The first meeting of creditors was held at Cardiff recently. The statement of affairs showed liabilities of £273, and a deficiency of £187. The case was left in the hands of the Official Receiver. Debtor attributed his failure to "trade depression, bad debts, and competition."

A. E. Hilton, electrician, 104, Carolgate Bridge, Retford, Notts.—The public examination was held on February 2nd at the Sessions House, Lincoln, when a statement of affairs was submitted which showed gross liabilities of £329 and a deficiency of £193. Debtor attributed his failure to keen competition, illness of his wife, &c.

H. Bennett, wireless engineer, 9, First Avenue, Wrea Green, Kirkham.—Public examination February 17th at the Sessions Hall, Lancaster Road, Preston.

M. Haar (Fleet Electric Service), electrical engineer, 36, Hurstwood Road, Golders Green, N.W.—Application for discharge to be heard February 23rd at Bankruptcy Buildings, Carey Street, W.C.

R. Woodruff, electrical and radio engineer and contractor, 4, Bridge Parade, Godstone Road, Purley.—Application for discharge to be heard February 23rd at the County Court, Scarbrook Road, Croydon.

A. Peat, electrical engineer, White Hart Street, Mansfield.—Receiving order made January 30th on debtor's own petition.

W. Rowlands, wireless dealer, 56, High Street, Bethesda.—First meeting February 10th at the Official Receiver's office, St. Peter's Churchyard, The Cross, Chester. Public examination February 24th at the Court House, Bangor.

C. Shepherd, radio engineer and dealer in wireless accessories, 69, Micklegate, York.—Discharge granted, but suspended for two months.

A. Roberts (Castle Radio Manufacturing Co.), 161, Westminster Bridge Road, S.E.—First and final dividend of 12s. in the £ payable February 13th at 150, Southampton Row, W.C.

Company Liquidations

J. Holbrook & Tattersall, Ltd., electrical engineers, 7, Foster Lane, E.C.—The accounts submitted under the compulsory liquidation of this company show liabilities of £2,123, against assets of £383. The following are the principal creditors:—Bowden Bros., Ltd., £138; D. L. Dwyer & Co., £210; Halseys Electric Co., Ltd., £80; Holborn Plating Co., £57; London Electrical Co., £164; G. Langdale, £360; Nash & Hull, Ltd., £51; Wallace Electrical Co., £126.

Meggs Electrical Co., Ltd.—Particulars of claims by February 24th to the liquidator, Mr. D. J. Black.

Radiovolt, Ltd.—Meetings March 6th at the offices of Messrs. Baker, Sutton & Co., Eldon Street House, Eldon Street, E.C., to receive an account of the winding-up by the liquidator, Mr. J. J. Baker.

Cymbal, Ltd.—Meeting March 6th at 25-31, Moorgate, E.C., to receive an account of the winding-up by the liquidator, Mr. R. F. Cameron.

Dissolutions of Partnership

Priory Electric Service, electrical engineers, 3, Lower Ford Street, Coventry.—Messrs. C. Taylor, W. D. Jones, and T. E. Morton have dissolved partnership. Mr. Jones will attend to debts and carry on the business in partnership with Mr. Morton.

J. O. Grant & Taylor, electrical engineers, 63, Victoria Street, S.W.—Messrs. J. O. Grant and H. J. Taylor have dissolved partnership. Mr. Taylor will attend to debts and carry on the business.

Private Arrangements

H. R. Malby (trading as Radio and Electrical Installations), 126, Portland Road, Hove, Sussex.—A meeting of creditors was held on February 3rd at Winchester House, E.C., when Mr. L. G. Darling, 87, Aldgate High Street, E.C., said that the liabilities amounted to approximately £240, and the total assets to £58, leaving a deficiency of £182. The debtor, who was at present working for his brother on a commission basis, said that he could pay the creditors a composition of 7s. 6d. in the £ within a month, which would be guaranteed by the brother. The creditors resolved to accept that offer, and appointed Mr. Darling trustee under a deed of assignment.

C. H. Browne, radio engineer, 133, Islingword Road, Brighton.—A meeting of creditors was held on February 3rd, at the offices of Mr. A. E. Orbell, 6 and 7, Old Steine, Brighton. The statement of affairs showed liabilities of £976, of which £650 was due to the trade, and the balance of £326 to cash creditors. After allowing £59 2s. for preferential claims, the net assets were £612, or a deficiency of £365. It was decided that subject to cash claims of £278 being withdrawn, the matter should be dealt with under a deed of assignment to Mr. Orbell. A committee was also appointed.

Notes from Canada.

BY OUR OWN CORRESPONDENT

THE International Association of Electrical Inspectors, whose headquarters are in Chicago, has recently stated in its monthly *News-Bulletin* that beginning with January 1st, 1933, the Underwriters' Laboratories' listing, label, and re-examination services on electrical devices and materials manufactured in Canada are to be discontinued, and that all, or nearly all, of these Canadian electrical products will be listed by the Hydro-Electric Power Commission of Ontario which will extend to them its listing and label service as already applied to other Canadian electrical products. Lightning rods and motors, controllers and fittings for use in hazardous situations will continue to be tested and listed by the Underwriters' Laboratories.

A further statement is that "The Hydro-Electric Power Commission will continue as heretofore and under the same arrangements with United States manufacturers to list a large number of electrical products manufactured in the United States on the basis of their being listed and labelled by the Underwriters' Laboratories. It is expected that the Underwriters' Laboratories will co-operate with the Hydro-Electric Power Commission and with the Canadian Engineering Standards Committee at Ottawa for the maintenance, as far as possible, of equivalent electrical standards." This new arrangement will add appreciably to the work of the Approval Laboratory of the Hydro-Electric Power Commission.

Canada's decennial census taken last year includes statistics relating to radio sets. The total number in use was 770,436 or 74.32 per 1,000 of the population. The number of sets amongst the urban population came to 98.87 sets per 1,000. The greatest density is in Ontario with 106.16 per 1,000 of the population; even the far-distant Yukon territory has 16.55 sets per 1,000 persons.

Hydro-electric Progress

The Minister of the Interior has recently reviewed the progress of hydro-electric development in Canada, which during 1932 was confined to undertakings in course of construction. Canada now has water power installations aggregating slightly over seven million horse-power—this is for a population of about eleven million. Construction is being continued on several large undertakings which will increase the total in 1933 and subsequent years.

Referring to the production of electrical energy, it is stated that the figures for the first ten months of 1932 indicate that electrical energy produced for use in Canada is practically the same as for the corresponding period—1931, and in August, September, and October an increase was recorded. The reduction in the total electrical energy production is almost entirely accounted for by the loss of export business, which for the first ten months of the year was almost 46 per cent. less than for the corresponding period of 1931. There is undoubtedly a steady increase in the energy produced for domestic use; the electricity consumption in the United States is about 10 per cent. less than in 1931, while in Canada it is almost unchanged.

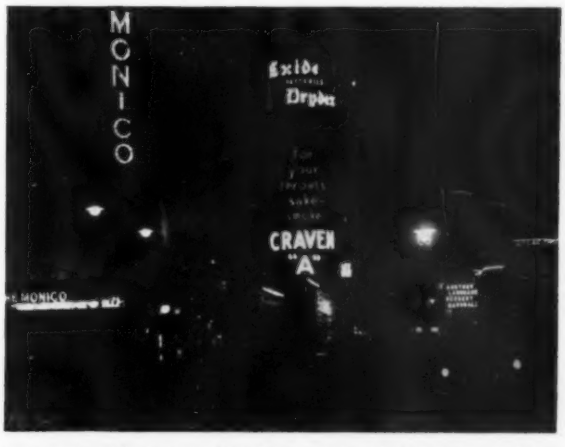
In Canada, as elsewhere, electric soil heating seems to be proving financially advantageous to those who adopt it. Electrically warmed hot-beds are being tried in Quebec, Ontario, and British Columbia, and reports seem to be very favourable. *Electrical News and Engineering* states that within a radius of forty miles there are at least 50,000 hot-beds, which at ½ kW per bed would amount to a load of 25,000 kW and have an annual consumption of some 25,000,000 kWh, entirely off the annual peak and possibly the daily peak.

Better Highway Lighting

In a plea for better highway lighting the same journal presents figures for Ontario showing that although there are fewer motor cars on the roads at night than in the daytime, yet no less than 40 per cent. of all accidents and 47 per cent. of all fatal accidents occur after dark. The largest number of accidents occurred at street intersections followed by those between street intersections and those on the straight road in the order named. Each of these three had more accidents than all other localities combined—the latter included rural intersections, private driveways, curves, hills, railway crossings, and bridges.

The inference to be drawn from the foregoing facts seems to be that, if the entire street and highway system cannot, for financial reasons, be adequately lighted, attention should be devoted to the three classes of localities first named, and especially the first two. The cost of such accidents in Ontario is about one million dollars annually, without counting the value of lost lives and of lost time and work.

The article gives a list of various advantages which would result if adequate highway lighting were provided. Amongst these advantages are the following: To the farmer where there are no existing distribution lines it would mean electrification with all its increased efficiency on the farm. To the central station it would mean lower annual capital charges on rural lines. To the electrical industry it would bring a large potential rural market.



A new "Exide" and "Drydex" neon sign has just been erected in Shaftesbury Avenue, near Piccadilly Circus

Electricity Supply

Lighting, Domestic, Power

Angus.—SCHOOL LIGHTING CHARGES.—With regard to the electric lighting of schools it was reported at a recent meeting of Angus Education Committee that the Grampian Electricity Supply Co. was prepared to grant rebates on the standard rates of 7½ per cent. when the aggregate account reached £750, and of 10 per cent. on an annual account of £1,000.

Arbroath.—A NEW TARIFF.—The Arbroath Electric Light and Power Co., Ltd., is to introduce a new tariff with a fixed charge per quarter, plus 1d. per kWh consumed, the lowest fixed charge to be £1 2s. per quarter, except in the case of small cottages.

Bamford (Derbyshire).—PUBLIC LIGHTING.—The Parish Council has adopted electricity for public lighting. The supply will be given by the Yorkshire Electric Power Co.

Barking.—HIRE AND HIRE-PURCHASE INSTALLATIONS.—The Electricity Committee recommends that payment in advance of the first quarter's rental shall be required for hire installations and that in the cases of all future applications for hire-purchase installations, the amount chargeable in respect of the service shall, if the consumer so desires, be included in the cost to be spread over the period of the agreement.

EXTENSIONS.—Arrangements have been made to extend mains at a cost of £997, and to provide a supply of electricity to Messrs. O'Gormans, Ltd., at Swedish Wharf, London Road.

Bath.—PUBLIC LIGHTING.—The Surveying Committee recommends the adoption of electricity for the whole of the public lighting. The scheme provides for the conversion of 991 gas lamps.

Birkenhead.—ASSISTED WIRING.—The policy to be pursued with reference to the assisted wiring scheme has occupied a great deal of attention recently, and a joint sub-committee of the Finance, Electricity and Gas Committees has considered the matter from the point of view of its effect upon the Gas Department. This sub-committee suggests that consumers under the assisted wiring scheme should pay a deposit together with a minimum amount to cover establishment charges, but the Electricity Committee is of the opinion that it is not feasible to charge either a deposit or a minimum repayment.

Blackburn.—REWIRING OF ABATTOIRS.—The Town Council is to rewire the electrical installation at the public abattoirs at a cost of £952.

Blackpool.—AN INDUCEMENT FOR INDUSTRIAL CONSUMERS.—In order to encourage the establishment of light industries in the town, the Electricity Committee has agreed to lay supply cables to such works free of charge and has asked the engineer to submit recommendations with a view to granting favourable discounts to large consumers.

EXTENSIONS AT MARTON.—The Electricity Committee has arranged terms with the Marton Parish Council for various electricity extensions.

Blyth.—SCHOOL LIGHTING.—The Education Committee has asked the North-Eastern Electric Supply Co. if it would be prepared to grant special terms if it were decided to adopt electric lighting in all schools.

Burton-on-Trent.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £650 to supply Bearwood Hill Road and High Bank Road.

Chichester.—BULK SUPPLY TO BOGNOR REGIS.—The City Council has agreed to give a bulk supply of electricity to Bognor Regis, subject to the Corporation's taking not less than 5,000,000 kWh per annum from Portsmouth, at the rate of 0.54d. per kWh for the first million kW per annum, 0.48d. per kWh for the second million kWh, 0.34d. per kWh for the third million kWh, and 0.32d. per kWh beyond. These terms are to operate during the continuance of the City Council's contract with Portsmouth, and subject to the approval of the Electricity Commissioners.

Colchester.—LOANS.—The Electricity Committee is to apply for sanction to loans of £5,000 for domestic apparatus, and £3,000 for sub-station plant.

OVERHEAD LINE EXTENSIONS.—Overhead lines are to be extended at Lexden at a cost of £340.

Dartford.—EXTENSIONS.—The Electricity Committee is to lay a feeder link in Spital Street at a cost of £550, erect and equip a sub-station at Dartford Road (£5,538), and install a further 230-kW rectifier plant at St. Vincent's Road station (£2,100).

Dorset.—ELECTRIFICATION OF VILLAGES.—A scheme for supplying electricity to villages from Bradford Abbas to Maiden Newton has been put in hand, and a main transmission line from Yeovil to Winterborne Abbas will be completed by the autumn.

Dundee.—THE CLOSING OF CAROLINA PORT STATION.—Sir Andrew Duncan, chairman of the Central Electricity Board, Sir Archibald Page, general manager and engineer, and other officials of the Board, visited Dundee last Friday and conferred with the Corporation Electricity Committee on the subject of the generating station at Carolina Port which the Board propose to close down for eight months of the year due to the operation of the grid scheme. The meeting, which was held in private, discussed security of supply, security against breakdown, and also the future of the staff. In a statement issued later it was explained that Sir Andrew Duncan undertook that the Board would deal as generously as possible with the staff, and any employés who were not absorbed in distribution would be assisted as far as possible to obtain employment. With regard to security against breakdown, it was pointed out that the grid was an additional security to consumers, and that while at the present moment two lines were brought into the city, the Board was to consider whether a separate additional line should not be erected.

Eastbourne.—LOANS.—The Electricity Committee has received sanction to the borrowing of £25,000 for mains and services, and has applied for permission to borrow a further £8,112 for a similar purpose.

NEW SUB-STATIONS.—New sub-stations are to be provided this year at a total cost of £8,112.

Glasgow.—CLOSING DOWN OF DALMARNOCK STATION.—At a recent meeting of the Electricity Committee a letter was read from the manager for Scotland of the Central Electricity Scheme, intimating that in the Central Electricity Board's programme for 1933 it was proposed to shut down the generating station of the Corporation at Dalmarnock at week-ends, weekday evenings and other off-load periods. The Committee, after hearing the town clerk and the manager on the proposal, agreed to express its disagreement with the Board's proposal, as it would result in a reduction in the number of men employed at the station, and further might prejudice the Corporation in the matter of the cost of electricity supplied to it. A special sub-committee was authorised to take such action as it might consider necessary to safeguard the Corporation's interests.

MAINS EXTENSIONS.—The Electricity Committee is to lay distributing mains at a cost of £13,966.

Glossop.—NEGOTIATIONS FOR CHEAPER ELECTRICITY.—The Town Council has decided to commence negotiations with the Urban Electric Supply Co., Ltd., with a view to securing a reduction in the price of electricity supplied to the borough.

Gloucester.—PURCHASE OFFER REJECTED.—The Town Council has decided not to entertain an offer by the West Gloucestershire Power Co., Ltd., to purchase the electricity undertaking.

Grampians.—FURTHER POWERS SOUGHT.—The Grampian Electricity Supply Co., which is controlled by the Scottish Power Company, has applied for a Provisional Order extending for four years from August next the time granted in 1922 within which to acquire all the lands necessary to complete its authorised works, and removing the restriction on raising capital in excess of £4,000,000 by Special Orders.

Guildford.—METERS.—The Electricity Committee is applying for sanction to the borrowing of £5,000 for meters.

Herne Bay.—ELECTRIC LIGHTING OF PIER.—The Urban District Council has applied for sanction to a loan of £700 for lighting the pier by electricity.

Horton.—PROPOSED CLOSING OF L.C.C. STATION.—Electricity for the five institutions on the Horton Estate, viz., Ewell, Horton, Long Grove, and West Park Mental Hospitals and The Manor certified institution, has been generated hitherto at a central station provided by the London County Council on the estate. The L.C.C. now proposes to close this generating station and to obtain supplies from Epsom Urban District Council. To adapt the wiring, switchgear, and electrical apparatus at the five institutions, which are designed for d.c. supply, to receive the U.D.C.'s a.c. supply will involve expenditure estimated at £10,500. Upon the closing down of the Council's generating station, redundant staff will be absorbed elsewhere in the Council's service.

Ilford.—SUPPLY TO PADNALL ESTATE.—The Electricity Committee is to provide an electricity supply to the Padnall Estate at a cost of £3,000.

India.—THE PYKARA SCHEME.—Electrical development in the Madras Presidency is making steady progress. The first stage of the Pykara Hydro-electric Scheme was placed in commercial operation in October last, and extensions to this system costing about Rs. 50 lakhs, are projected for this year. Plans and designs for a new 30,000-kW hydro-electric development are being prepared with the idea of commencing construction in 1934.

PROPOSED NEW STATION FOR AHMEDABAD.—The Ahmedabad Electric Supply Co. is contemplating the erection of an additional power station.

Isle of Wight.—CARISBROOKE SCHEME HELD UP.—The Isle of Wight Electric Light Co. has informed the Isle of Wight Rural District Council that owing to objections to the erection of overhead lines in Castle Street, Carisbrooke, it is proposed not to proceed with the scheme at present.

Littleborough (Lancs).—MAINS AND SERVICES.—The Urban District Council is to make application for sanction to the borrowing of £1,000 for mains and services.

Liverpool.—REPORT ON PROPOSED PURCHASE OF PRESCOT UNDERTAKING.—The City Council has asked its Finance Committee to report on the proposal that the Corporation should acquire the Prescot electricity undertaking of British Insulated Cables, Ltd., for £136,278. The area of supply covered is approximately 20 sq. miles. The total maximum demand is 5,735 kW, of which 4,613 kW (14,896,775 kWh) is taken by the factory supply, and 1,150 kW (2,628,670 kWh) by the district supply. The existing lighting charges are 6d. per kWh, subject to a discount of 16 per cent. for increasing usage, less 2½ per cent. for cash; heating, cooking and power, 1½d. discount

up to 18 per cent. plus 2½ per cent. for cash. If the Prescot undertaking is purchased, the prices will be brought down to the Liverpool level by about 1941.

Mr. P. J. Robinson, the Liverpool electrical engineer, explains that no profit can be made on the factory supply to the British Insulated Cables until the expiration of the period during which the company will be charged cost price. He is of opinion that it is reasonable to assume that the electrification of the L.M.S. railway line through Roby and Huyton to Prescot will take place in a few years' time, and experience has shown that electrification of suburban passenger services leads to immediate building developments. It is expected that 3,000 houses will be built in the Prescot road district within the next few years. He anticipates the sale of 4,000,000 kWh a year for domestic purposes within four years and 7,750,000 kWh in nine years.

EXTENSIONS.—The Electric Power and Lighting Committee intends to apply to the Electricity Commissioners for an Order to enable the Corporation to supply electricity to certain premises in the districts of Aughton, Melling, Huyton and Roby.

NEW SUB-STATION.—It is proposed to build and equip a new sub-station in the Mossley Hill district. H.p. mains are estimated to cost £770, l.p. mains £825, and sub-station equipment £750.

London.—HACKNEY.—The Electricity Committee proposes to abolish the minimum charges for supplies for ordinary consumers, and the two-part tariff for prepayment consumers using electricity for cooking and other domestic purposes, comprising a weekly rental of 2½d. per point, plus proportional charges for cooker, kettle, &c., all energy being charged for at ½d. per kWh.

Luton.—RURAL EXTENSIONS.—The Town Council has applied for sanction to a loan of £7,525 for extensions of transmission lines and distribution cables to Milton Bryan, Eversholt, Tingrith, Steppingley, and Sharpenhoe, together with switchgear and transformers.

Manchester.—CONTINUED PROGRESS.—During December the Electricity Department recorded an increase of 5,425 kW in connections, bringing the total to 525,600 kW. Applications for supplies, including additional supplies, numbered 1,670, representing 2,732 kW. There were 218 new cookers connected, making 10,884 on circuit, and orders received for the hire of cookers amounted to 112. Wash-boilers show a marked increase in popularity and at the end of December there were 389 in use, of which thirteen were connected during the month. One new sub-station was put into commission and new plant was installed at two existing sub-stations. The output from the Barton station for 1932 is the highest on record, totalling 417.5 million kWh (388.5 million kWh in 1931).

New Romney.—OVERHEAD LINES.—The Folkestone Electricity Supply Co., Ltd., has informed the Town Council that a tender has been accepted for the erection of the h.t. main from Dymchurch to Lydd, and the line will be constructed immediately outstanding wayleave questions are cleared up.

Oban.—IMPROVEMENT OF SUPPLY.—A scheme for the improvement of the electricity undertaking in Oban, estimated to cost £28,000, has commenced. The power station is to be equipped with two new 450-h.p. Diesel engines generating a.c. at 11,000 V. This plant will be controlled by a new h.p. switchboard and distributed to selected points in the town.

Penrith.—COUNCIL NOT TO ACQUIRE UNDERTAKING.—The Urban District Council has decided not to take steps to acquire the electricity undertaking of the Penrith Electricity Supply Co., Ltd., and has agreed to amend the Order which would enable the company (now controlled by the Electrical Distribution of Yorkshire, Ltd.) to continue as distributors in the area until 1931. A committee which had carried out the negotiations reported that to press the purchase of the undertaking would involve arbitration and the result would place a heavy burden on the ratepayers for many years without any possibility of cheaper electricity. The company has agreed to a reduction from 8d. to 6d. per kWh for lighting, with corresponding concessions under other tariffs.

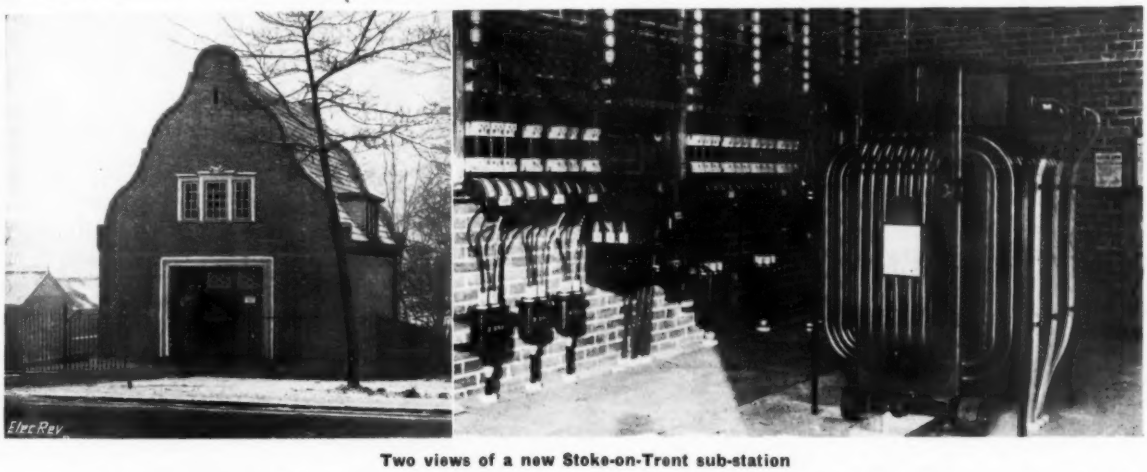
Pontardawe.—ELECTRICITY SCHEME COMPLETED.—With the recent inauguration of the supply to the Ystalyfera and Godregraig areas, the Urban District Council's electricity scheme has now been completed. Electricity was available for Clydach and Pontardawe last November, the whole scheme having cost about £10,000.

Preston.—ELECTRICITY FOR POULTRY FARMS.—There are now 150 poultry farms in Preston and district using electricity.

Ripon.—A SUPPLY FOR MARKINGTON.—The Electricity Committee has decided to provide a supply of electricity for Markington at a cost of £1,800. The Bishopston and Galphay cables are also to be linked up at a cost of £623.

LOANS SANCTIONED.—Sanction has been received to a loan of £1,210 for supplying electricity to the villages of Galphay, High Grantley, and Sawley.

Stoke-on-Trent.—A SUB-STATION IN A RESIDENTIAL AREA.—The sub-station shown in the accompanying photographs has been started up within the last few days in Hartshill, one of the best residential districts in Stoke-on-Trent. The sub-station is situated on the grounds of the Dominican Convent and the land was sold subject to the stipulation that the building should conform with the surroundings. The high-voltage cubicle gear (on the right hand of the sub-station) does not appear in the photograph. The low-voltage switchgear, which is of a type commended by the Home Office, has been built up and erected by Mr. C. H. Yeaman's staff. The sub-station forms part of the d.c. to a.c. change-over in progress in the city and feeds into the existing network.



Two views of a new Stoke-on-Trent sub-station

Tynemouth.—MAINS.—Sanction to the borrowing of £10,000 for unspecified mains has been received by the Town Council.

Wimbledon.—UNDERTAKING PURCHASE RIGHTS.—At a recent meeting of the Law Committee the town clerk, referring to the purchase rights of the electricity undertaking, stated that the objections of the Council to the proposals of the Joint Electricity Authority had been forwarded to the Electricity Commissioners; and the Commissioners had promulgated a draft Order which did not recognise these objections, and had given notice of their intention to hold an inquiry. He further reported that the Authority had, on the understanding that the respective Councils would not appear in opposition to the draft Order, offered to give an undertaking that, in the event of the Order being made transferring the purchase rights of the Urban District Councils in the Corporation's electricity undertaking to the Authority, they would not exercise such purchase rights otherwise than in accordance with the request of the Urban District Councils, or otherwise than by agreement with the Wimbledon Council; that it was considered that this undertaking would not adequately protect the interests of the respective Councils; and that the Council should join the Urban District Councils in opposing the draft Order. The chairman and town clerk, in consultation with the Maldens and Coombe and Merton and Morden Urban District Councils, were authorised to retain counsel to appear in support of the joint opposition.

REDUCTIONS IN CHARGES.—The following reductions in electricity charges are to be made:—As from last December quarter meter readings, lighting charge reduced from 3½d. to 3d. per kWh; as from the March quarter meter readings, all energy consumed for lighting over 20,000 kWh per annum reduced to 2½d. per kWh; for the maximum demand system (as from April 1st), winter lighting charge reduced from 3d. to 2½d. per 20 W per week.

NEW SUB-STATIONS AND CABLES.—The Electricity Committee has approved the provision of three new sub-stations and alterations and additions to other sub-stations at an estimated cost of £5,300. The laying of supplemental cables and the replacement of cables at a total cost of £4,905 is also recommended by the Committee.

Traction

Glasgow.—TROLLEY-BUSES.—The Corporation is being asked by its Transport Committee to apply for powers in the next Provisional Order to operate trolley-buses.

TRAFFIC CONTROL.—The Magistrates Committee has decided to urge the Streets Committee to expedite the installation of automatic traffic control signals at busy street crossings.

India.—DIESEL-ELECTRIC SERVICE INAUGURATED. — The Gaekwar of Baroda on January 16th inaugurated the new service of four Armstrong-Whitworth Diesel-electric rail-coach tractors on the Gaekwar's Baroda State Railway. The rail-coach tractors are the first of their kind to be placed in service in India, and their fuel cost averages one-third of a penny a mile. They were ordered with a view to supplying a cheaper and, at the same time, a more rapid and comfortable mode of travel to meet road competition. The units have been built for use on 2 ft. 6 in. gauge lines.

Japan.—NEW ELECTRIC RAILWAY COMPLETED.—An elevated electric railway about 1¼ mile in length has recently been put in operation between Ochanomizu and Ryogoku, near Tokio. The line is being worked on the single trolley wire system at 1,500 V d.c.

London.—MORE TRAFFIC SIGNALS.—The City Police Committee recommends the provision of additional traffic signals at a cost of £2,195.

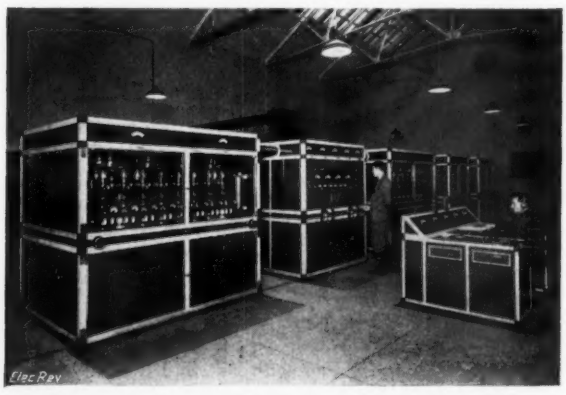
Newcastle-on-Tyne.—TRAMWAY SPEED-UP.—The City Council is to fit high-speed motors on five trams in order to speed up the service to some extent. The average speed of the trams, including time for setting down and picking up, is stated at present to be 8¼ m.p.h.

Rowley Regis.—TRAMWAY ABANDONMENT OPPOSED.—The Urban District Council has decided to oppose the proposed abandonment of the tramway service between Oldbury and Dudley.

Sweden.—ELECTRIFICATION OF A PRIVATE RAILWAY.—The good results obtained from the electrification of State Railway lines has now led the largest private railway company, the Bergslagernas Jaernvaegsaktiebolag, to go into the question of electrifying its lines, says *Reuter's Trade Service* from Stockholm. Similar investigations have already been made by the company from time to time, the last one being in 1926, and it is believed that the new investigation can be completed this year. In the first place it is planned to electrify only the section of the railway with the most traffic, namely between Gothenburg and Aamaal, a distance of 164 km. One of the reasons for this limitation of the programme is the fact that the Bergslagernas Jaernvaeg uses particularly large steam locomotives, which cannot easily be sold to other private railways. Preliminary calculations place the cost of the electrification of the above section at about Kr. 9,000,000. Work will not be started until next year at the earliest.

Communications

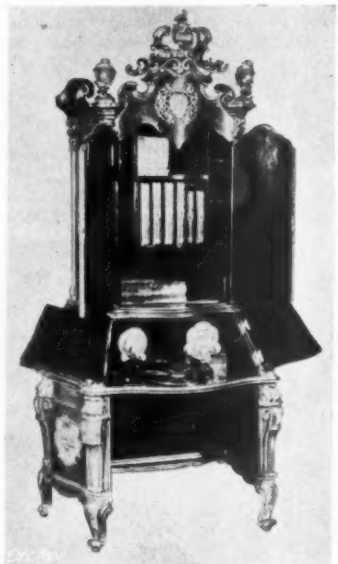
China.—TELEPHONE EXTENSIONS.—In order to bring the northern and southern portions of the province of Kiangsu into closer contact, the *Chinese Economic Bulletin* reports that the Provincial Reconstruction Department is planning an extension of the existing long-distance telephone system in Southern Kiangsu to six of the large towns in the northern section of the province. Of the 75 *hsien* districts in Chekiang province, 55 are now linked by telephone, the lines having a total length



The Marconi equipment at the new Athlone high-power broadcasting station which was inaugurated by Mr. de Valera on Monday last

of over 6,000 *li*, approximately 2,000 miles. The system is classified into trunk, divisional, and sub-divisional lines, the trunk connections being intended chiefly for interprovincial communication. With a central exchange in Hangchow, there are seven divisional exchanges, 21 sub-divisional exchanges of the first class and 18 sub-divisional exchanges of the second class in the more important towns of the province, besides 48 "agencies" in cities and 50 "agencies" in rural districts. Long-distance service in Chekiang province has been made available to nearly 90 per cent. of the population of the province. The 20 *hsien* districts not yet provided with these facilities are thinly populated, and of very little commercial or industrial importance. In June, 1932, over 1,000 calls were registered at 14 exchanges and over 500 calls at 11 exchanges, the monthly average of calls at each exchange being about 900. The tolls charged vary with distance and time limit.

France.—RADIO CONTROL DECREE.—A decree providing for the organisation of a police wireless service and for the control of broadcasting stations in France was issued on January 31st by the Ministry of the Interior. The central office of the police network, which will be controlled by the Sûreté Générale, will be at the Ministry of the Interior. It will send out police messages to sub-stations which are to be set up in various parts of the country, and in due course finger-prints and other anthropometric details will be transmitted for photographic reproduction. The central station will also communicate with stations abroad when international co-operation is necessary. Finally, says *The Times*, the new organisation will be responsible for the control of all transmitting stations, including those worked by amateurs, and for the detection of unauthorised stations.



An ornate radio set presented to the Pope by the city of Milan

Great Britain.—RADIO RELAY EXCHANGES.—The Bridlington Town Council has received applications from Rediffusion, Ltd., and Radio by Wire (Beverley), Ltd., for permission to establish a relay service in the borough. A deputation is to inspect the exchanges in operation at Hull and Beverley.

The Folkestone Town Council has given permission to Folkestone Radio Relays, Ltd., to link up the service with the Corporation housing estate.

The Heanor U.D.C. has informed Rediffusion, Ltd., that it is not prepared to consider a service until a canvass as to the need for such an installation has been made.

Irish Free State.—NEW RADIO STATION.—The new high-power broadcasting station at Athlone, which is equipped with Marconi plant, was opened officially on Monday evening last, the ceremony and a special musical programme arranged for the occasion being broadcast by the station. The new station is using the Dublin station's present wavelength of 413 metres, the Dublin station remaining silent when the new transmitter is functioning.

Lanark.—POLICE WIRELESS.—The Lanark County Council has been in correspondence with the Scottish Office regarding a proposal for the installation of radio-telephony apparatus for police purposes. The Scottish Office stated that it was probable that under an arrangement which might be formulated it would be necessary to limit wireless installations to selected centres in order to avoid interference. It might be possible to arrange that installations at these centres would cover the needs of a number of neighbouring forces, and that each force should contribute towards the cost in proportion to the advantages which it received. The chief constable's view is that a centralised system in the West of Scotland would not meet the needs of scattered country districts. It was decided to continue consideration pending further communication from the Scottish Office.

B.S.S. for Air-break Switches

Revisions of two British Standard Specifications for air-break switches and circuit breakers, first issued in 1923, are now available, *i.e.*, No. 109, "Air-break Knife Switches and Laminated Brush Switches," and No. 124, "Totally enclosed Air-break Switches," both up to 660 V. The temperature limitations have been brought into line with those imposed by the recently issued revision of the Specification for busbars. The range of sizes has now been extended to include a rating of 15 A, and only two standard voltage ratings are recognised instead of three. A test for breaking capacity is now included in both Specifications, and other detail improvements have been incorporated. Copies of these Specifications may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 6d. each, post free.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—March 7th. Department of Posts and Telegraphs. Telephone handsets. (A.X. 11675.)*
March 21st. Tumbler switches. (A.X. 11676.)* Telephone terminal strips. (A.X. 11677.)* Microphone component parts. (A.X. 11678.)*

Aylesbury.—February 22nd. Electricity Department. General electrical stores. (See this issue.)

Bedford.—February 27th. Electricity Department. Underground cables and lamp. (See this issue.)

Bexley.—Electricity Department. Transformers, including cable work and switchgear. (See this issue.)

Blackburn.—February 27th. Electricity Department. Cable, rubber insulated wire, and meters. (January 20th.)

Dundee.—February 13th. Corporation. Electric lighting installation at Constitution Street housing scheme. City quantity surveyor, 91, Commercial Street.

Hamilton.—Electricity Department. L.p. cables. (January 27th.)

India.—February 28th. Bengal and North Western Railway Co., Ltd. 26,500 tungsten filament lamps. (See this issue.)

Kettering.—February 24th. Electricity Department. E.h.p. and l.p. underground cables. (See this issue.)

Leeds.—February 21st. Electricity Department. Annual contract for stores. (January 27th.)
March 7th. Transformers. (See this issue.)

Long Eaton.—March 1st. Electricity Department. Cables, coal, service meters, and service cut-outs. (See this issue.)

London.—HAMMERSMITH.—February 22nd. Borough Council. General stores. (January 27th.)

Midlothian.—February 13th. County Council. Various works, including electrical, in connection with housing schemes. County architect, 9, Drumsheugh Gardens, Edinburgh.

Oldham.—March 2nd. Public Assistance Committee. Electric lamps and fittings for Rochdale Road Institution. Public assistance officer.

Salford.—February 23rd. Electricity Department. Electrical apparatus and stores. (February 3rd.)
March 2nd. General electrical stores. (See this issue.)

South Africa.—MOSUL BAY.—February 15th. Municipal Council. Generating plant, including water-tube boiler, alternator sets, switchboard panels, 100-kVA transformers and distribution material. (A.X. 11664.)*

Stoke-on-Trent.—March 6th. North-West Midlands J.E.A. Transmission lines and outdoor static transformers. (January 27th.)

Swansea.—April 1st. Electricity Department. Stores for twelve months. (February 3rd.)

Torquay.—February 20th. Corporation. Twelve months' supply of electric lamps, &c. Borough engineer.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Ashford (Kent).—Urban District Council. Accepted. Construction of overhead lines to Folkestone in connection with the bulk supply (£11,663).—Callender's Cable & Construction Co., Ltd.

Australia.—N.S.W. Transport Department. Accepted. 700 40-h.p. traction motors (£130,364).—Associated General Electric Apparatus Co., Ltd.

Barking.—Electricity Committee. Accepted. Cable (£1,113).—Hackbridge Cable Co., Ltd.

Barrow-in-Furness.—Education Committee. Accepted. Electric lighting at Barrow Island School (£255).—Electricity Department.

Birmingham.—Salvage Committee. Accepted. Steam driven generating plant and electric vehicle charging equipment at Montague St. depôt.—United Electrical Co. (Coolex), Ltd.
Education Committee. Accepted. Electric lighting at Paget Road school.—Davis & Millward.
Electricity Committee. Accepted. Rewinding of turbo-alternator No. 1 at Prince's generating station, Nechells.—British Thomson-Houston Co., Ltd.
Health Committee. Accepted. Electrical installations.—Nurses' Home, Isolation Hospital, Walker Bros. (Electrical Engineers), Ltd.; Selly Oak infirmary, W. L. Horrobin.
Public Works Committee. Accepted. Electrical installation at Handsworth Council House.—W. L. Horrobin.

Blackpool.—Electricity Committee. Accepted. L.p. board.—British Insulated Cables, Ltd. Copper and lead.—British Insulated Cables, Ltd.; Pirelli-General Cable Works, Ltd.

Eastbourne.—Electricity Committee. Accepted. Extension of overhead line to Carters Corner (£434).—Overhead Lines, Ltd. Recommended. Cables for twelve months.—Standard Telephones & Cables, Ltd. (£685), and Craigpark Electric Cable Co., Ltd. (£7,334).
Public Assistance Committee. Accepted. Fire alarm system at St. Mary's Institution (£131).—H. Beney & Son.

Glasgow.—Corporation Housing Committee. Accepted. Electrical installations at housing scheme (£728).—Darroch & Espie.

Halifax.—Town Council. Accepted. Electrical work in connection with the development of King's Cross Street.—Gath Electrical Engineering Co., Ltd.

London.—L.C.C.—Public Assistance Committee. Accepted. Installation of fire alarm and automatic telephone system at Swaffield Road institution (£580).—Ellis & Ward, Ltd.
L.C.C. Housing Committee. Accepted. Wiring and fittings for dwellings on Brockley site (£331).—Coleby & Co.
HACKNEY.—Works Committee. Recommended. Traffic control signals at Englefield and Southgate Roads (£66).—Laurence, Scott & Electromotors, Ltd.
Electricity Committee. Recommended. Water-softening plant (£1,252).—United Water Softeners, Ltd.

Maidenhead.—Town Council. Accepted. One 150-kVA transformer for the Craufurd Arch sub-station (£107).—Hackbridge Electrical Construction Co., Ltd.

Manchester.—Housing Committee. Accepted. Electrical installations at 860 houses in the Royal Oak area, Wythenshawe Estate.—H. C. Taylor & Co., Ltd., and R. H. Clampett & Co., Ltd.

Sheffield.—Tramways Committee. Recommended. 500 steel tramcar tyres.—Hadfields, Ltd.

Sunderland.—River Wear Commissioners. Accepted. Electrical haulage gear at the South Dock (£2,900).—Stothert & Pitt.

Tynemouth.—Town Council. Accepted. Cable (£142).—Macintosh Cable Co., Ltd.

Forthcoming Events

Electrical Power Engineers' Association (London Technical Group).—Tuesday, February 14th. Junior Institution of Engineers, London. 7.15 p.m. "The E.h.t. Gas Pressure Cable." Dr. E. Bowden.

Illuminating Engineering Society.—Tuesday, February 14th. Institution of Mechanical Engineers, London. 7 p.m. "Everyday Photometry by Photo-electric Cells." Dr. J. W. T. Walsh.

Overhead Lines Association.—Wednesday, February 15th. Institution of Electrical Engineers. 5.30 p.m. Discussion on "The Difficulties We Encounter and Our Means of Overcoming Them." Opened by Mr. H. Wilson.

Institution of Welding Engineers.—Wednesday, February 15th. Institution of Mechanical Engineers, London. 7.45 p.m. "Where Oxy-Acetylene and Electric Welding Join Forces." Mr. O. Simonis.

Institution of Electrical Engineers.—Thursday, February 16th. Grosvenor House, Park Lane, W. 7 for 7.30 p.m. Annual dinner. (*Sheffield Sub-Centre*).—Friday, February 10th. Annual supper and dance. Wednesday, February 15th. Royal Victoria Hotel, Sheffield. 7.30 p.m. Address by the president, Prof. E. W. Marchant, to be followed by a smoking concert. (*Meter and Instrument Section*).—Friday, February 10th. Institution, London. 7 p.m. Informal discussion. "The Advantages and Limitations of the various types of Two-part Tariff Prepayment Meters." (*Mersey and North Wales (Liverpool) Centre*).—Monday, February 13th. Central Hall, Renshaw Street, Liverpool. 7.30 p.m. Faraday lecture, "Lighting—and how the Engineer deals with its Effects." Prof. J. T. MacGregor-Morris. (*North-Eastern Centre*).—Monday, February 13th. Armstrong College, Newcastle-upon-Tyne. 7 p.m. Paper by Mr. J. M. Kennedy and Miss D. M. Noakes. (*North-Western Centre*).—Tuesday, February 14th. College of Technology, Manchester. 7.30 p.m. Faraday lecture by Prof. J. T. MacGregor-Morris. (*Scottish Centre*).—Tuesday, February 14th. Royal Technical College, Glasgow. 7.30 p.m. Tour through the electrical engineering laboratories, arranged by Prof. S. Parker Smith. (*North Midland Students' Section*).—Tuesday, February 14th. Hotel Metropole, Leeds. 7.15 p.m. "Railway Electrification." Mr. R. N. Kinder.

Institution of Mechanical Engineers.—Friday, February 17th. Institution, London. 5.30 p.m. Annual general meeting.

British Electrical Development Association.—Friday, February 17th. Caxton Hall, S.W. 7.30 p.m. Discussion on "Water Heating." Opened by Mr. P. C. Honey.

Association of Mining Electrical Engineers.—Friday, February 17th. Royal Hotel, Cardiff. 7 p.m. Annual dinner and dance.

Institute of Marine Engineers.—Friday, February 17th. Connaught Rooms, W.C. 7 p.m. Annual dinner.

Physical Society.—Friday, February 17th. Imperial College of Science and Technology, S.W. 5 p.m. Short papers.

The World Power Conference

The World Power Conference has issued a reminder that a sectional meeting is to be held in Scandinavia this year. All the technical sessions are to take place in Stockholm between June 28th and July 4th. The papers to be submitted will include the following: "A Survey of Industrial Electric Power Supply in Great Britain," by Messrs. H. Hobson, F. Forrest, and C. D. Taite; "The British Coal Survey," by Dr. F. S. Sinnatt and Mr. H. E. Mitton; "Some Notes on English Diesel-electric Practice," by Mr. A. E. L. Chorlton; "Electric Resistance Furnaces," "High-frequency Induction Furnaces," and "The Handling of Urban and Suburban Passenger Traffic by Railway, Electric Traction, Tramways, and Motor Omnibuses" (authors not named). Forms of application for membership will be available shortly from the British National Committee, 63, Lincoln's Inn Fields, W.C.2.

Notes

The Illuminating Engineering Society

The twenty-fourth annual dinner of the Illuminating Engineering Society was held on Tuesday. Replying to the toast of the Society that had been proposed by Mr. James Swinburne in an amusingly reminiscent vein, Lt.-Commander Haydn T. Harrison (president) said that the coming of the hot-cathode lamp introduced a new era for illuminating engineers. But it also brought new complications from the psychological aspect owing to the monochromatic character of its light. He also referred to another outstanding achievement of the past year, the development of the photo-electric cell as a substitute for the photometer. The Society had had a most successful year and had increased its membership; the dinner was a record one (over 200 were present), which was to be attributed to the energies of Mr. J. S. Dow (hon. secretary) and Miss Wright.

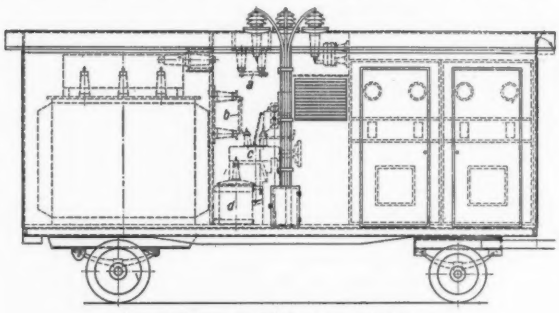
"The Guests" was proposed by Mr. A. W. Beuttell and Messrs. R. E. Gibson and Sydney Tatchell responded. The latter, speaking as vice-president of the Royal Institute of British Architects, said that the members of his profession wished to be regarded as belonging to the family of those interested in illumination questions. The dance which concluded the function was as enjoyable as those of previous years. Some of those present were of the opinion that it was even more so.

Individual Drives for Looms

Addressing the Blackburn Textile Society recently, Mr. F. B. Holt, of the Metropolitan-Vickers Electrical Co., Ltd., urged the adoption of the individual electrical drive for cotton looms. This system gave an even turning movement without speed variation that could not be obtained with a steam engine. In the Burnley district the electric drive had proved to be cheaper by 2.1d. per loom per week for the same production. This would enable production to be increased by at least 5 per cent., and cloth to be woven at 0.094d. per yd. as against 0.11d. These savings were fully appreciated by our foreign competitors.

A Travelling Rectifier Station

The accompanying illustration depicts a travelling mercury rectifier station which has recently been constructed by the Siemens-Schuckert Co., of Berlin, for the Belgian Société Nationale des Chemins de Fer Vicinaux to meet the extra power requirements of local railways caused by traffic. The equipment is mounted on a rubber-tyred trailer so that it can be hauled by a tractor to any particular point of the railway system where it can readily be connected up to the h.p. system for converting to 610 V d.c. The equipment comprises two 350-A rectifiers and a transformer-convertor designed to deal with twenty-eight steps of pressure between 4,400 and 15,000 V, all necessary changes in the connections being made externally. The vehicle, which has an overall length of 20 ft. 6 in., is



A travelling rectifier for railways

divided into two main compartments, in one of which are situated the transformer and h.p. apparatus, and in the other the two rectifiers and the controlling switchboard. When in operation, the working of the bulbs can be inspected from the switch attendant's compartment through suitably located windows. Special provision has been made in the mounting of the glass bulbs of the rectifiers to prevent damage by vibration.

Appointments Vacant

Professor of electrical engineering for Heriot-Watt College, Edinburgh.

Travelling inspecting engineer for National Register of Electrical Installation Contractors.

Showroom sales manager for the Newcastle and District Electric Lighting Co., Ltd.

Junior charge engineer for Darlington Electricity Department.

Installation inspector for Morecambe and Heysham Electricity Department.

(See our classified advertisements.)

Condensing Plant Data

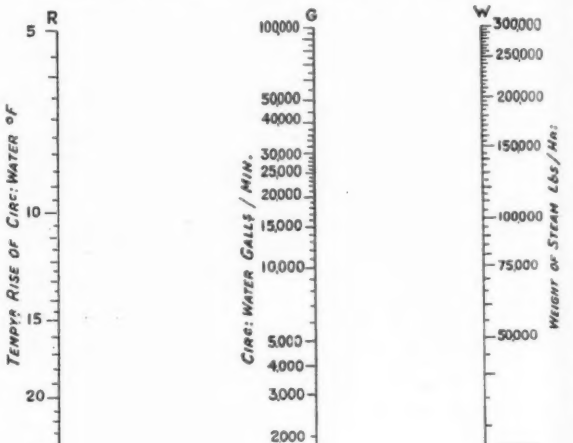
A knowledge of the amount of cooling water that is being passed through a condenser is often required for determining the state of a condenser or circulating water pump or the cause of low vacuum. For ascertaining this quantity without lengthy calculation and with some degree of accuracy the nomogram reproduced has been constructed.

The weight of steam condensed and the rise in temperature of the circulating water must be known; the latter should be taken if possible in tenths of a degree, since an error of 0.5 degree affects the ultimate result by 5 per cent.

The water quantity is calculated from the formula:

$$G=\frac{H\times W}{60\times 10\,(T_2-T_1)}$$

where G = quantity of water in gal. per min., W = weight of steam condensed in lb. per hr., T_2 = circulating water outlet, T_1 = circulating water inlet, and H = heat rejected to con-



Circulating water quantity chart

denser; a fair figure for the last for present-day practice is 1,000 B.th.u. In determining H in the usual way the dryness fraction of the steam to the condenser is taken into account, but this is difficult to obtain without special apparatus.

Reciprocating Compressors for Tramcars

Brake compressor sets for use on tramcars have to be of compact design, as they are usually placed under the floor of the vehicle, where space is very restricted. Brown, Boveri & Co. have recently developed a new compressor set which takes into account these requirements of tramcars. In order to keep the dimensions of the motor as small as possible, a self-ventilated machine running at high speed, approximately 1,200 r.p.m., was chosen. Since, on the other hand, to obtain maximum simplicity, reliability, and maintenance, a slow-running compressor should be used (not more than 260 r.p.m.), the compressor shaft is driven by a bevel reduction gear with a ratio of about 1 : 5. The compressor is of the single-stage type and has two cylinders working in parallel with automatically operating pressure and suction valves. The whole set forms an enclosed unit, and, even when space is very limited, can be mounted without difficulty under the floor of the vehicle.

Up to the present, two types of the brake compressor sets have been made, the characteristics of which are given in the following table:—

Delivery Volume in litres per min.	Bore. mm.	Stroke. mm.	Speed of Compressor. r.p.m.	Motor output intermitt. rating H.P.	Weight approx. lbs.
200	86	100	260	2.5	385
360	110	120	220	3.5	550

The weights given apply to sets with ventilated motors. In cases where there is the risk of the motor being exposed to much dirt underneath the vehicle, totally enclosed motors can be provided, in which case the weights of both types are increased by about 35 per cent. The windings of the motors can be designed for d.c. up to 1,200 V. A large number of the compressors are already in service on the Padua and Genoa tramways in Italy, where they are giving very good results.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

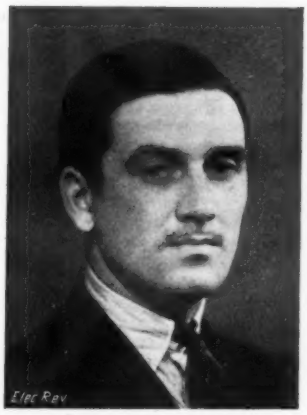
We shall be glad to learn the names and addresses of the makers of the following:—

STANDARD motors.
WYNK-A-LITE flashers.
ASBESTON insulating material.
"M. & N." and CEEARAY reflectors.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. Dennis Z. de Ferranti, manager of the Meter Department of Messrs. Ferranti, Ltd., was elected to the directorate at a meeting of the board held on February 3rd.



Mr. D. Z. de Ferranti

Mr. S. B. Jackson, A.M.I.E.E., of the Central Electricity Board, has been awarded the Sir Archibald Denny Gold Medal by the Council of the Institute of Marine Engineers for his paper entitled "Pulverised Fuel Firing with Special reference to Power Station Practice," read in March, 1932. The presentation will be made at the forthcoming annual general meeting of the Institute.

Mr. L. A. Gripper, distribution superintendent at Croydon, has been recommended for the appointment of deputy electrical engineer to the Eastbourne undertaking in succession to Mr. D. W. A. Roberts, who recently resigned. There were 143 applicants for the post.

Mr. A. Imbery, A.M.I.E.E., formerly managing director of the British Resistor Co., Ltd., Trafford Park, Manchester, has commenced business on his own account as consulting engineer on industrial electrical matters and the development of certain electric heating specialities which he has recently patented. His address is St. Alban's Avenue, Halifax.

Mr. W. H. Heaton

Mr. W. H. Heaton, who, on February 1st, completed twenty-one years' service as works manager of the General Electric Co.'s engineering works at Witton, Birmingham, on that evening received a series of presentations to which over 7,500 members of the works staff and employés contributed. The presentation consisted of a silver casket containing a scroll bearing the names of between fifty and sixty of the oldest employés of the company, in addition to a number of smaller presentations from the various departments. The presentation was made by Mr. T. G. Woolger, the oldest foreman, at a dinner at the Magnet Club.

Mr. S. H. Stanley, A.M.I.E.E., assistant manager to, and for forty-two years with, the Westminster Electric Supply Corporation, Ltd., and five years with the London Electric Supply Corporation, Ltd., retired on January 31st.

Mr. C. P. Paige, who, as announced in our last issue, has been appointed transport manager to Bury Corporation, served his apprenticeship with a firm of automobile and electrical engineers. He served with the Royal Air Force during the war, and upon demobilisation in 1919 was appointed engineer to the Eastbourne Aviation Co., Ltd. His next post was with Messrs. Aitken Grinstead & Co., Ltd., and in 1922 he was appointed manager of the Ashby Motor Services, Ltd., Tunbridge Wells. Later in the same year he became general manager of Bangor Blue Motors, Ltd., and while with this company reorganised the undertaking. He has held his position of traffic manager jointly with the Yorkshire (West Riding) Electric Tramways Co., Ltd., and the West Riding Automobile Co., Ltd., for nearly eight years. Mr. Paige was elected an associate member of the Institute of Transport in 1927.

Mr. C. P. Paige

The Earl of Rothes has accepted the presidency of Faraday House Old Students' Association for the ensuing year, and Major G. A. B. Leishman and Mr. M. D. Cloran have been elected vice-presidents.

Mr. A. P. Wood has resigned his position as Managing Director of the Lancashire Dynamo & Crypto Co., Ltd., and joined the Board of Laurence, Scott & Electromotors, Ltd., of Norwich and Manchester. Mr. Wood, with the late Sir Harry Kilvert and his brother, started the Lancashire Dynamo & Motor Co. at the end of the last century. He has been managing director almost from its inception. Mr. Wood's address is: c/o Laurence, Scott & Electromotors, Ltd., Openshaw, Manchester.

Mr. A. P. Wood

Mr. A. G. Blake has resigned his position as manager of the Illuminating Department of Messrs. L. G. Hawkins & Co., Ltd. His address is 108, Bedford Road, Clapham, S.W.4.

Mr. E. R. Sanderson, the author of the article on "Trickle Charging" which appears on page 186 of this issue, received his training and early experience with Messrs. Mather and Platt, Ltd., Manchester. In 1917 he joined the Royal Naval Air Service, becoming an airship pilot on anti-submarine patrols. After the war he was for a time assistant electrical engineer to the Hulton Colliery Co., Lancs, during the equipping of the company's all-electric Cronton pit. In 1920 he went to the Chloride Electrical Storage Co., Ltd., and was recently transferred to the London office of that company. Mr. Sanderson has devoted a good deal of time and attention to applications of storage batteries and has been responsible for the design and development of the "Keepalite" system of emergency lighting under the direction of the chief engineer, Mr. E. C. McKinnon. He is an associate member of the Institutions of Civil and Electrical Engineers.

[Wykeham Studios
Mr. E. R. Sanderson

Mr. P. A. Spalding, formerly engineer and manager of the Dundalk electricity undertaking, is reported by the Irish Press to have been missing since January 10th, when he was returning to Ireland from London.

Mr. C. R. Belling, always busy and full of vim, has been letting off some of his surplus energy enjoying the winter sports at Klosters. He appears in the accompanying picture with **Mr. C. L. Arnold**, of "M.K." Electric. Mr. Belling writes: "Sun and snow have been splendid so far, and no electric power is necessary to enable one really to speed down the famous Parsenn Run—about 8 miles without a stop (except for crashes!)."

Mr. C. L. Arnold (left) and Mr. C. R. Belling (right) in the Swiss Alps

Mr. J. B. Earle has joined the sales staff of Messrs. Erskine, Heap & Co., Ltd., Manchester, for the Lancashire, Cheshire, and Derbyshire area.

Mr. E. W. Meare is shortly terminating his services with the Wandsworth Electrical Mfg. Co., Ltd., after representing the company for seven years in London and the South Coast.

Dr. P. Kapitza, director of the Royal Society Mond Laboratory, the opening of which is reported on page 191, was born at Kronstadt in 1894, and studied at the Petrograd Polytechnical Institute (Faculty of Electrical Engineering). After lecturing at that Institute from 1919 to 1921, he was Clerk Maxwell Student at Cambridge University from 1923 to 1926. He was elected a fellow of Trinity College in 1925, and Corresponding Member to the Academy of Science of the U.S.S.R. in 1929. He was appointed assistant director of magnetic research at the Cavendish Laboratory, Cambridge, in 1924, and the importance of his investigations has been recognised by his appointment as Messel Professor of the Royal Society.

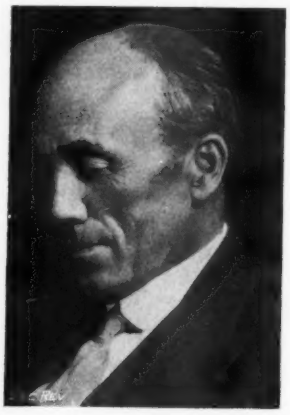
Mr. W. Young, A.M.I.E.E., deputy electrical engineer, has been presented with a radio-gramophone by the staff of the Stepney electricity undertaking upon his retirement. The presentation was made by Mr. W. C. P. Tapper, the borough electrical engineer and manager, at a supper and concert held on January 30th. Mr. Young, after serving for seven years with the Brighton undertaking, went to Stepney in December, 1899.

Mr. J. H. Rider has now ceased to act as consulting engineer to the Council of the Incorporated Municipal Electrical Association in all matters of bulk supply raised by members, as the Council feels that there is now no necessity for permanently retaining a consulting engineer for this purpose.

Prof. Wolfgang Gaede, director of the Physical Institute at Karlsruhe, and until recently Professor of Physics at the Technische Hochschule there, has been awarded the Duddell Medal by the Council of the Physical Society.

Obituary

Mr. H. W. Roberts.—We record with deepest regret that Mr. H. V. Wynne Roberts, director and sales manager of the General Electric Co., Ltd., passed away on February 4th at the early age of forty-nine years after influenza quickly followed by pneumonia. He was taken ill on January 24th. Mr. Roberts, who was born in North Wales, was educated at Canterbury, and he joined the General Electric Co. in January, 1901, in the counting house, a department from which many of the company's men of distinction have risen. In 1903 he was transferred to the Fittings Department, where later he became second in command to the late Mr. George Maurice. In November, 1909, he was appointed manager of the Engineering Supplies and Ventilation Department, and in 1918 became sales manager. In 1929 he was appointed a director of the company, a reward for his long and zealous service. In his younger days he was prominent in all G.E.C. athletics, and latterly retained a live interest in all social and athletic activities. Staff welfare was one of his special interests; he was a member of the committee of the company's Sick and Benevolent Fund for over twenty years, and of its Pensions Fund from 1921.



[*Lafayette*
The late Mr. H. W. Roberts

Outside the company he rendered widespread service to the industry, for he was prominently associated with the work of the B.E.A.M.A., the E.D.A., the E.A.W., and other electrical organisations, and was always in demand at electrical functions, particularly those connected with the E.C.A. During the past year he took a very active part in the formation of the Building Centre, and was vice-chairman of the E.D.A. Committee responsible for its electrical section. Mr. Roberts was remarkable for an amazing capacity for work, and thirty-two years in the electrical industry had given him a knowledge of it, and particularly of trading conditions within it, which was encyclopædic. We do not think that anybody could be found to dispute the claim for him that he possessed a most agreeable personality and inspired confidence in all with whom he had business or conference relations. His loss will be felt not only by the company but by the electrical industry as a whole. He leaves a widow and five children, with whom there is widespread sympathy. The funeral service took place on Wednesday at St. Peter's Church, Ealing, followed by interment at the City of Westminster Cemetery, Ealing.

Mr. R. Foster.—We regret to record the death of Mr. Robert Foster, M.I.E.E., North-Western Area manager of the Simplex Electric Co., Ltd., which occurred shortly after reaching his office on February 1st, from an attack of angina pectoris. Before the formation of the Simplex Electric Co., Ltd., in November last, Mr. Foster had for twenty years acted as Northern agent for the Credenda Conduits Co., Ltd.; Tubes, Ltd.; and the Bromford Tube Co., Ltd. Previous to this he was the chief electrical engineer to the Aston Manor Borough Council, before its absorption by the City of Birmingham. Last summer Mr. Foster organised a golf tournament in Manchester, which resulted in a considerable contribution to the Benevolent Fund of the I.E.E. He became an associate member of the Institution of Electrical Engineers in 1905, and a member in 1910.

The late Mr. R. Foster

Mr. R. A. Williams.—We regret to learn that Mr. R. A. Williams, engineer and manager of the British Municipal Electricity Department, Tientsin, died on December 20th last after an illness of only two days. Mr. Williams was a very popular member of the British community of Tientsin, where he was prominent in all social activities.

Mr. J. Dines.—The death occurred suddenly on January 30th, at the age of fifty-three years, of Mr. John Dines, who had for thirty-eight years been on the staff of Crompton & Co. and Crompton Parkinson, Ltd., of Chelmsford.

Mr. J. W. Tanner.—The death has taken place at Maldon, Essex, of Mr. John Williams Tanner, who for thirty years resided in Persia, where he was assistant director of the Indo-European Telegraph Department. He returned to England in 1917, and was twice Mayor of Maldon.

Mr. J. E. Cuthbertson.—The death occurred on Saturday last, from pneumonia, of Mr. James E. Cuthbertson, B.Sc., A.I.E.E., who for about ten years was chief engineer of Bush House, London.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Electrical Facilities, Ltd.—Private company. Registered January 31st. Capital, £100,000 in £1 shares. Objects: To carry on the business of financing the acquisition by others of, and supplying and dealing in, electrical installations, wiring, cables, fittings, apparatus, machinery, plant, &c. The subscribers are: F. Riley, Knowle, Champion Hill, S.E.5; and W. C. Hay, 43, Wayside Avenue, Hornchurch. Solicitors: Hill Dickenson & Co., 88, Leadenhall Street, E.C.3.

De Renzi, Holmes & Co., Ltd.—Private company. Registered February 4th. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers of electrical switchgear and apparatus, mechanical and electrical engineers, &c. The directors are: V. I. Holmes, Jes Dene, Goldthorn Hill, Wolverhampton; and Agnes M. L. de Renzi (governing director), Henwood House, Compton, Staffs. Secretary: Victor I. Holmes. Registered office: Fox's Lane, Wolverhampton.

Leach Electrical & Engineering Co., Ltd.—Private company. Registered February 4th. Capital, £1,000 in £1 shares (500 5 per cent. preference). Objects: To adopt an agreement with Sidney G. Leach and Engineering Supplies, Ltd., and to carry on the business of electrical engineers and agents, &c. The directors are: H. A. Dormer, 18, Westcliff Parade, Westcliff-on-Sea; and S. G. Leach, "Glebelands," Withdean Road, Brighton. Secretary: G. Dickson. Registered office: 11, Queen Victoria Street, E.C.4.

Brown & Oliver (Wireless), Ltd.—Private company. Registered January 31st. Capital, £1,000 in £1 shares. Objects: To acquire the business of a wireless retailer and electrician now carried on by A. N. Brown at 36, Park Street, Luton. The subscribers are: H. W. Oliver, 28, Bearton Road, Hitchin, Herts; and A. N. Brown, 36, Park Street, Luton. Secretary: E. W. Halbert, 12, Medina Road, Luton.

Wilson Dickson & Co., Ltd.—Private company. Registered in Edinburgh on January 31st. Capital, £2,000 in £1 shares. Objects: To acquire the business of Wilson Dickson & Co., electrical engineers, 185, High Street, Ayr. The directors are: A. Somerville, 17, Woodfield Road, Ayr; and J. G. Dickson, 37, Hawkhill Avenue, Ayr. Registered office: 185, High Street, Ayr.

Tudor Electrical Fittings Co., Ltd.—Private company. Registered February 2nd. Capital, £400 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in lighting fittings, wireless and television apparatus, &c. The directors are: H. J. Brown, 209, Walsall Road, Perry Barr, Birmingham; and N. G. Sturgess, Richmond, Tudor Hill, Sutton Coldfield. Registered office: 41, Hylton Street, Birmingham.

Returns of Electrical Companies

Electrical Finance & Securities Co., Ltd.—Satisfaction to the extent of £4,100 on October 31st, 1932, of debenture stock covered by trust deeds dated July 29th, 1927, July 6th, 1928, April 24th, 1930, and January 29th, 1932, and registered July 29th, 1927, July 10th, 1928, April 29th, 1930, and February 1st, 1932.

Ferranti, Ltd.—Capital, £900,000 in 500,000 7 per cent. cumulative preference shares of £1 and 800,000 ordinary shares of 10s. Return dated September 30th, 1932. 500,000 preference and 600,000 ordinary shares taken up. £353,834 paid on 353,834 preference shares. £446,166 considered as paid on the remainder. Mortgages and charges, nil.

Drake & Gorham, Ltd.—Capital, £125,000 in £1 shares. Return dated November 22nd, 1932. All shares taken up. £85,000 paid. £40,000 considered as paid. Mortgages and charges, £68,792.

Curtis Manufacturing Co., Ltd.—Capital, £6,000 in £1 shares. Return dated August 25th (filed October 18th), 1932. All shares taken up. £1,000 paid. £5,000 considered as paid. Mortgages and charges, nil.

Robinson & Hands Electric Co., Ltd.—Capital, £5,000 in 4,980 preference and 20 ordinary shares of £1 each. Return dated December 6th, 1932. 4,232 preference and 20 ordinary shares taken up. £4,252 paid. Mortgages and charges, nil.

New North Radio, Ltd.—Particulars filed of not more than £600 debentures authorised December 29th, 1932, charged on the company's property, present and future, including uncalled capital, the whole amount being now issued.

Pegasus, Ltd.—Particulars filed of £2,000 debentures, authorised by resolutions of January 16th and 20th, 1933, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

British Pix Co., Ltd.—Satisfaction to the extent of £1,300 on January 1st, 1933, of debenture dated July 5th, 1932, and registered July 7th, 1932.

Radiocraft Supplies, Ltd.—Satisfaction in full on January 20th, 1933, of debenture dated September 7th, 1926, and registered September 11th, 1926. (According to the register of mortgages, the debenture registered September 11th, 1926, originally secured all moneys due to bank.)

Clifford & Snell, Ltd.—The nominal capital has been increased by the addition of £1,000 beyond the registered capital of £2,000 in 1,000 preferred ordinary shares of £1 each. The capital has been reorganised and is now £3,000 in 1,650 preferred ordinary and 1,350 ordinary shares of £1 each.

City Notes

The Yorkshire Electric Power Co. reports a net profit of £372,774 for 1932, as compared with £357,917 in 1931, to which is added £80,383 brought forward, making £453,157 (£441,418). As announced in our last issue, it is proposed to pay a final ordinary dividend of 5 per cent., making 8 per cent. for the year (same), to place £125,000 to general reserve (making £900,000), and to place £24,693 to renewals fund, leaving a balance of £80,428 to be carried forward. The sales of electricity increased from 208,507,624 kWh to 215,156,631 kWh, the decrease in the use by collieries consequent on trade conditions being more than met by the increased demand of other consumers. The 27,500-kW turbo-alternator at Thornhill power station was put into regular service during the year. The Central Electricity Board has fixed January 1st, 1933, as the date pursuant to Section 7 (1) of the Electricity (Supply) Act, 1926, in respect of the company's Barugh, Ferrybridge and Thornhill undertakings, all of which are selected stations. From this date the company is under obligation to operate the stations at such rates of output and at such times as the Board may direct and to sell to the Board all electricity generated at these stations. The North Lincolnshire and Howdenshire Electricity Special Order, 1932, has been transferred to the North Lincolnshire and Howdenshire Electricity Co., Ltd., a company in which the whole of the capital is held in trust for the Power Co. The Power Co. has purchased the whole of the shares of the Barton-on-Humber Electric Supply Co., Ltd. The distribution system has been further extended to meet additional demands from existing consumers and to provide for new connections. After the annual meeting, to be held in Leeds on February 21st, resolutions will be submitted to authorise the conversion of the issued ordinary shares, and the six per cent. cumulative preference shares to ordinary and preference stock respectively. A resolution will also be submitted to authorise a further contribution of £5,000 towards the building fund of the Leeds University.

The Mid-Southern Utility Co. held its annual meeting on February 2nd, when Mr. R. W. Edwards, who presided, said that for some years the net sales of gas had shown continued increases, but for 1932, in consequence of periods of mild weather, and probably also of economies exercised by the general public, the sales showed a small decrease (0.4 per cent.). The electricity department was developing satisfactorily, the total advance in sales, as compared with 1931, being 49.5 per cent. Apparatus of various types installed during the year represented an additional load of 2,960 kW, as compared with 2,280 kW for the previous year. Considerable extensions had recently been completed, the demand for further development was still fairly good, and a number of schemes were in hand.

The German Siemens Group.—After setting aside from the special reserve the sum of 4.5 million marks for the remainder of the loss devolving on the Siemens and Halske Co. from the Shannon business, the directors of the company report disposable net profits of 6,973,708 marks for 1931-32 (8,614,863 marks in 1930-31), to which is added 2,215,584 marks brought forward. It is proposed to pay a dividend of 7 per cent. on the capital entitled to participate, this comparing with 9 per cent. in 1930-31, and to carry forward 2,885,316 marks. In the case of the Siemens-Schuckert Works Co., it is stated that as in the previous year no distribution will be made on the share capital. In so far as the loss cannot be covered by the yield on participations, interest and extraordinary revenue, it will be met by an appropriation from undisclosed reserves. The extraordinary loss, in particular the remainder resulting from the Shannon business, the writing down of the shares in the Bergmann Company and of the holding in the Maffei-Schwartzkopff Company, has been covered by the transfer of 12.2 million marks from the special reserve which was formed for the purpose.

The Metropolitan Electric Cable & Construction Co., Ltd., held its annual meeting on February 3rd, when Mr. James Miller, chairman, presided. In the course of his speech Mr. Miller said that there had been a further increase in the turnover during the past twelve months, and although competition had been extremely keen, and rates of profit considerably reduced, the earnings of the company compared favourably with those of the previous twelve months. The weight of cable now leaving the factory had reached such a figure that the directors were seriously considering the advisability of purchasing vehicles suitable to transport the company's products instead of contracting as in the past. He was optimistic regarding the company's prospects, and felt confident that the current year would produce a still greater turnover and, he trusted, a return to a more reasonable ratio of profit. Mr. Brown, managing director, in seconding the motion, referred to the fact that during the year additional plant had been installed, and said he was satisfied that the factory was well equipped to continue its progress.

The Tyneside Tramways & Tramroads Co. reports a profit for the year ended December 31st last of £5,204, to which is added £251 brought in, making £5,455. Mortgage interest absorbed £4,120, and £1,280 is transferred to prior mortgage redemption fund, leaving a balance of £55 to be carried forward.

The Power Securities Corporation, Ltd., last year had a gross income of £136,600 (against £135,279) and an available balance of £98,382, to which was added £25,232 brought forward, making £123,614. It is proposed to pay a dividend of 7 per cent. (same) on the ordinary shares and carry forward £25,464. Valuation of investments, &c., at December 31st showed a total value higher than that at which they stand in the balance sheet. Meeting: February 15th.

Lissen, Ltd., reports a profit for 1932 of £174,359, which, with £30,357 brought in, makes £204,716 available. Reserve receives £80,000, and it is proposed to pay a dividend of 12½ per cent. on the ordinary shares, leaving £34,716 to be carried forward. The report states that there was a substantial expansion in the business during the year, which necessitated the purchase of a freehold factory with an area of 75,000 sq. ft. The benefits of this acquisition will be obtained during the current year.

Dublin United Tramways, Ltd., has declared a dividend for the half-year at the rate of 4 per cent. per annum, making 3 per cent. for the year, less tax (unchanged). A sum of £21,000 has been appropriated for track renewals and £10,000 is set aside for mortgage redemption. The amount carried forward is £14,184.

The Electrical & Industrial Investment Co., Ltd., records a net profit of £19,518 (£22,834) plus £1,482 brought in. Reserves at the end of the year totalled £53,154, which is more than sufficient to cover depreciation of investments as shown in the balance sheet. Meeting: February 15th.

Companies Struck Off the Register.—The names of the following companies have been struck off the Register and they are thereby dissolved:—British Curtis Radio, Ltd.; Dakol Electric, Ltd.; Norman Radio, Ltd.; Skegness Electricity Supply Co., Ltd.

The Westminster Electric Supply Corporation, Ltd., has declared a final dividend of 4½ per cent. on the ordinary shares, making the standard dividend for the year of 7 per cent.

The Singapore Traction Co. proposes to pay a dividend of 4 per cent. on the seven per cent. cumulative preference shares on account of arrears (against 7 per cent. a year ago).

The City of Buenos Aires Tramways Co. (1904), Ltd., has announced a final dividend of 1s. 3d. per share, making 5 per cent. for the year (unchanged).

Grosvenor Electric Batteries, Ltd., has announced an interim dividend of 5 per cent. on the ordinary shares (same).

Stocks and Shares

TUESDAY EVENING.

THE principal point of interest in the Stock Exchange markets at the present time is the activity shown in the market for South African gold shares. The "Kaffir boom" has had the effect of diverting attention from other parts of the Stock Exhange, and of leading to sales of shares, from the proceeds of which the buyers of South Africans are financing their commitments.

The strength of the gilt-edged market is well maintained. The 4½ per cent. debenture stocks of the electricity authorities are firm, that of the Central Electricity Board having advanced to 107. Parliament may now elect to loosen the bands of restraint which have been clamped upon the energies of local authorities who wanted to spend money upon utility and other such objects, but who have been held back from doing so by the insistent call for economy. This call has resulted in development programmes being severely curtailed, and in a consequent falling-off of the orders which companies—such as those concerned with electrical manufacturing and distribution—would otherwise have obtained, and which will come along, of course, in due time. If the economy stunt, as it is colloquially called, is to be abandoned in favour of the new slogan of "wise spending for unemployment," there may be a fresh impetus given to the extension of electrical work. This

is the view taken in the market for shares in the electricity manufacturing and construction companies.

Home Railway Stocks

While Metropolitan District at 59½ shows a slight decline, the price of Metropolitan Railway consolidated stock is 2 points higher at 62. The latter is due to investment buying on behalf of people who cleave to the idea that the stock will attract a good deal of attention, at anything like the present price, if the London Passenger Transport Bill is carried in this, the new, session of Parliament. Underground Electric ordinary shares are steady at 19s. The list of tramway issues shows no variation worth mentioning.

Debenture Stocks on Offer

There is available £20,000 London Power new 4 per cent. debenture stock, 1952-72, at 104½ free of stamp and fee. This pays £3 16s. 6d. per cent. The first interest payment, of £1 per cent., is due in July next. A higher yield, £4 13s. 6d. per cent., can be obtained from South Wales Electric Power Distribution 5 per cent. prior lien debenture, of which £5,000 is offered at 106¾, with six months' interest payable in July. The company can redeem the stock at 105 at any time upon giving notice. Midland Counties Electric 4 per cent. debenture costs 104, free of stamp and fee. The yield is £3 17s. per cent. The first interest payment, 22s. per cent., is payable also in July.

There has been a little selling of the two Cables & Wireless ordinary stocks, but the 5½ per cent. preference marks a modest improvement at 83½. No change of consequence has occurred in Globe Telegraph & Trust shares. Great Northerns have fallen 30s. to 28s. It is contended in the market that the shares at the present price make an attractive speculative investment by reason of the yield which is obtainable on the basis of the 20 per cent. dividend at present being paid. American Telephone & Telegraph shares have receded to 144½, showing a drop of 11 points. Internationals are lower at 9, and Western Union common stock receded to 32½.

Electricity Supply Changes

Improvements in the shares of the Provincial Companies group include Newcastle District, 33s. 9d., Midland Counties, at the same price; Midland Electric Power at 35s. 9d., and North Eastern ordinary 29s. 6d. There has been a good inquiry for Yorkshire ordinary, the price of which strengthened a florin to 42s. Llanelly ordinary have advanced to 20s. 6d. West Gloucestershire ordinary stock at 64½ is a little lower. In the London group, County of London ordinary have firmed up to 52s. Hendons are better at 94s. 6d.

Amongst "foreign" shares, Whitehall Electric preference have again been in demand from trust companies, and the official price of 17s. 6d. fails to represent the actual market quotation, which is nearer 18s. 9d. Atlas ordinary are a shade easier at 8s., the preference remaining unchanged at 22s. 1½d.

An interesting development is the jump of 6s. 3d. in the price of Victoria Falls & Power ordinary shares, from 77s. 6d. to 83s. 9d. This is due, not so much to the Kaffir boom, as to its being pointed out that the Victoria Falls Company is rapidly reducing its debenture debt, and that in the course of about three years there will be no debentures left. The annual amount required for service of these debentures, that is, for interest and sinking fund, will then become available, in part, for dividend on the ordinary shares, of which there are £1,000,000 in issue.

Edmundson Rumours

Edmundsons' Electricity Corporation has been the subject of interesting rumours which reported that the control had been transferred from the Greater London and Counties Trust, to the Prudential Assurance Company. The Prudential denied the rumour. Control of the Greater London & Counties Trust is owned by the Utilities Power & Light Corporation, a Canadian subsidiary of an American company of the same name. Edmundsons' is interested in more than three-score electricity supply undertakings, and it is quite reasonable to suppose that efforts will be made, sooner or later, to get the full control of the concern into British hands.

Manufacturing and Equipment

It will be noticed, by reference to the list of prices, that the shares of the principal manufacturing companies show a tendency to droop. This is due, as explained in an earlier paragraph, to the diverting of public interest from the industrial share market to that in South Africans and other gold-mining descriptions. An exception to the rule is a rise in Brush stocks. The ordinary is quoted at 57, and the company's debenture stocks are both better, the first debenture being 76, and the second 70. General Electrics are a little lower at 40s. 9d. Henleys have gone back to 6 7/8, Callenders to 3, and British Insulated to 3¾. Associated Electrical Industries ordinary eased off to 17s. 6d., Johnson & Phillips to 20s., Siemens ordinary to 26s. 3d. For these movements there is no special reason other than that already quoted. British Aluminium advanced to 24s. 6d. Ever-Ready have been a feature of strength, the price improving to 30s. 3d., while the preference rose to 40s., and Ever-Ready Trust shares to 21s. 3d. This is due to the publication of an excellent report by Lissen, Ltd., most of whose share capital is held by the Ever-Ready Co., and the Ever-Ready Trust.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price, Feb. 7.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	71/3	—	4 4 3
Brompton Ordinary	1	8½	8½	33/6	—	4 3 7
Central Electricity 4½% Deb.	Stock	4½	4½	107	+1	4 4 0
Charing Cross Ordinary	1	8½	8½	33/6	—	4 3 7
Chelsea	1	8½	8½	33/–	—	4 4 10
City of London	1	10	10	34/6	—	4 1 2
Clyde Valley	1	8	7	35/–	—	4 0 0
County of London	1	11	10½	52/–	—	4 0 8
Edmundsons' 7% Pref.	1	7	7	29/6	—	4 15 0
Elec. Dis. Yorkshire	1	9	9	42/6	—	4 4 8
Elec. Supply Corporation	1	11	11	63/9	+½	3 9 0
Kensington Ordinary	1	8	8	33/6	—	4 3 7
Lancs. Light and Power	1	6½	7	32/6	—	4 6 2
London & Home Counties 4½% Deb.	Stock	4½	4½	106	—	4 5 0
London Electric	1	9	9	33/–	—6d.	4 4 10
Metropolitan	1	10	10	48/9	—	4 2 0
Midland Counties	1	7	7	33/9	+6d.	4 3 1
Mid. Elec. Power	1	8	8	35/9	+9d.	4 9 5
North Eastern Electric Ordinary	1	6	6	29/6	+6d.	4 1 4
Do. 7% Pref.	1	7	7	32/–	—	4 7 6
Northampton	1	10	10	50/–	—	4 0 0
Notting Hill 6% Pref.	10	6	6	12¾	—	4 14 0
North Met. Elec. 6% Pref.	1	6	6	29/–	—	4 2 1
St. James' and Pall Mall	1	8	8	33/–	—	4 4 0
Scottish Power	1	8	8	35/–	—	4 11 5
South London	1	8½	8½	33/–	—	4 4 10
Urban Ordinary	1	7	7	31/6	+9d.	4 1 2
Westminster Ordinary	1	8½	8½	33/–	—	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	17/6	—	8 11 2
Yorkshire Elec.	1	8	8	42/–	+2/–	3 16 2
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	82½	—	4 17 0
Metropolitan	„	3½	2½	62	+2	4 0 8
Do. District	„	5	4½	59½	—½	7 11 4
Underground Electric	1	8	7	19/–	—	7 7 4
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	144½	—	6 4 6
Anglo-Am. Tel. Pref.	Stock	6	6	105½	—	5 13 9
Do. Def.	„	1½	1½	25	—	6 0 0
Cables & Wireless 5½% Pref.	„	5½	2¾	83½	+2	3 5 10
Do. A 7½% Ord.	„	—	Nil	27½	—¼	—
Do. B Ord.	„	—	Nil	11	—½	—
Globe Tel. and T. Ord.	10	8½	Nil	11	—	—
Do. do. Pref.	10	6	6	11½	—	5 6 8
Great Northern Tel.	10	20	20	28	—1½	7 2 10
Marconi-Marine	1	15	10	35/–	—	5 14 3
Oriental Telephone Ord.	1	12	12	3	—	*4 0 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	—	—	1/9	—	—
Do. do. 2nd Pref.	5	—	—	1/9	—	—
Do. do. 5% Deb.	Stock	—	—	6	—	—
British Electric Traction Def. Ord.	„	5	5	230	+5	—
Do. do. Pref. Ord.	„	8	8	134½	+2	5 19 0
Brazil Traction	100	—	—	10½	—	—
Brit. Columbia Elec. Rly. Pfd.	Stock	5	5	102½	—	4 19 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	12/–	—	—
London United Tram Deb.	Stock	4	4	67½	—	6 2 2
Mexico Trams, 5% Bonds	—	5	5	47½	—	10 10 6
Mexican Light Common	100	Nil	Nil	10	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	73	+3	6 17 0
Victoria Falls Ord.	1	15	15	73/9	+⅛	3 11 7
Yorkshire (West Riding)	1	Nil	Nil	5/6	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	4	17/6	—⅛	4 11 5
Do. Pref.	1	8	8	32/–	—	5 0 0
Babcock & Wilcox	1	14	14	38/3	—3/–	—
British Aluminium Ord.	1	10	5	24/6	+9d.	4 1 8
British Insulated Ord.	1	15	15 –	67/6	—⅛	4 8 4
Brush Ord.	Stock	5	Nil	57	+20	—
Callender's	1	15	15	3	—⅛	5 0 0
Do. 6½% Pref.	1	6½	6½	28/3	—	4 12 0
Crompton Parkinson Ord.	5/–	30	24	22/6	—	5 0 0
Do. 8% Pref.	1	8	8	30/–	—	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	13/9	—	—
Enfield Cable Ord.	1	25	25	4¾	—	5 8 1
English Electric	1	Nil	Nil	12/6	—	—
Do. do. Pref.	1	Nil	Nil	10/–	—6d.	—
Ever Ready	5/–	35	35	30/3	+1/9	5 15 8
Ferranti Pref.	1	7	7	23/9	—	5 18 0
G.E.C. Pref.	1	6½	6½	29/–	—	4 9 8
Do. Ord.	1	10	8	40/9	—1/9	3 18 4
Henley's	1	30	30	6⅞	—⅛	4 15 1
Do. 4½ Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	2/6	—	—
Johnson & Phillips	1	10	5	1	—⅛	5 0 0
Siemens Ord.	1	7½	7½	26/3	—9d.	5 14 1
Telegraph Construction	£1	Nil	Nil	16/3	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931.

6619. "Static apparatus for the production of electrical discharges." Papeteries Navarre Soc. Anon. November 20th, 1930. (386327.)

8744. "Continuously acting mechanical interrupter or switch." A. Smallwood and J. Fallon. December 21st, 1931. (386342.)

12861. "Electric induction motors." W. W. Triggs (Barber-Colman Co.). May 1st, 1931. (386309.)

17083. "Microphonic apparatus for the transmission and reception of sound." C. C. L. Gregory. June 12th, 1931. (386315.)

19917. "Electric remote control systems." Standard Telephones and Cables, Ltd., J. G. Flint, E. F. Bates, and J. B. Griffiths. July 10th, 1931. (386337.)

19930. "Electric burglar alarms and the like." H. J. Tibbles, H. C. Tibbles, and Rely-a-bell Burglar & Fire Alarm Co., Ltd. July 10th, 1931. (386345.)

19949. "Liquid-break electric circuit breakers." British Thomson-Houston Co., Ltd. July 10th, 1930. (386322.)

24266. "Electromagnetic relay mechanism responsive to voltage control." R. Wetzer. February 9th, 1931. (386354.)

24448. "High-frequency signal transmission systems." British Thomson-Houston Co., Ltd. September 2nd, 1930. (386356.)

26818. "Photo-electric cells and their uses." W. Barsties. September 25th, 1931. (386369.)

27005. "Protective apparatus for electric circuits." British Thomson-Houston Co., Ltd. September 29th, 1930. (386370.)

27125. "Electric power converting apparatus." British Thomson-Houston Co., Ltd. September 29th, 1930. (386371.)

28084. "Systems of electrical remote control and supervision." General Electric Co., Ltd., and J. E. Collyer. October 9th, 1931. (386375.)

28128. "Electric discharge devices." British Thomson-Houston Co., Ltd. October 9th, 1930. (386376.)

28290. "Illumination control system." Igranic Electric Co., Ltd. October 11th, 1930. (386378.)

29118. "Automatic telephone systems." Siemens Bros. & Co., Ltd., W. G. Patterson, and D. P. Long. October 20th, 1931. (386381.)

30616. "Reciprocating electric motors." T. V. Dillstrom, P. A. Astradsson, and F. Dahlgren. November 4th, 1931. (386386.)

31144. "Winding for electrical induction furnaces without a closed ferro-magnetic circuit." Allmanna Svenska Elektriska Aktiebolaget. August 29th, 1931. (386387.)

32094. "Loud-speaker units." E. S. Newland. November 19th, 1931. (386396.)

33184. "Galvanic batteries." Oldham & Son, Ltd., and W. D. Wilde. November 30th, 1931. (386400.)

34197. "Heaters for continuously moving wires, bars, bands, threads or the like." General Electric Co., Ltd. December 10th, 1930. (386412.)

34859. "Insulated terminals." H. Ayliffe. December 16th, 1931. (386422.)

35077. "Electric lampholders." F. Deutsch. December 18th, 1931. (386425.)

35248. "Improved switch device for use in the electrical systems of automobiles." H. R. C. McCarthy. December 21st, 1931. (386426.)

35573. "Mercury arc rectifiers." General Electric Co., Ltd., and E. Gallizia. December 23rd, 1931. (386429.)

1932.

1114. "Totalisators." Ericsson Telephones, Ltd., and F. Limb. January 14th, 1932. (386439.)

1539. "Tapes for distinguishing and insulating the cores of multi-core electric cables." Rotunda, Ltd., and H. Hands. January 19th, 1932. (386443.)

1743. "Electric current collectors." G. J. Moreby. January 20th, 1931. (386444.)

3583. "Dynamos for vehicles." R. Bosch Akt.-Ges. February 6th, 1931. (386452.)

6632. "Magnetic alloys." Westinghouse Electric & Manufacturing Co. March 24th, 1931. (386470.)

6706. "Apparatus for preventing damage by electric earth currents and earth radiations." G. F. Von Pohl. March 5th, 1931. (Addition to 388268.) (386471.)

8000. "Loud speakers." Marconi's Wireless Telegraph Co., Ltd. (Radio Corporation of America.) March 17th, 1932. (386477.)

8158. "Microphones." Marconi's Wireless Telegraph Co., Ltd. March 31st, 1931. (386478.)

9812. "Electron discharge tubes or thermionic valves." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 9th, 1931. (386484.)

10186. "Wireless receiving apparatus." A. J. Pollack and E. H. Roberts. April 9th, 1932. (386487.)

11062. "Electric water heaters of the immersed element type." V. Spencer. April 23rd, 1931. (386491.)

11228. "Arrangement embodying a positive column luminous tube for television purposes." Fernseh Akt.-Ges. April 24th, 1931. (386492.)

11644. "Means for joining metal wires or cables to members of all kinds, especially electric wires." Etablissements A. Emile & ses Fils. April 25th, 1931. (386498.)

11992. "Thermionic and like amplifiers." Marconi's Wireless Telegraph Co., Ltd. May 21st, 1931. (386500.)

11993. "Electron-discharge device amplifiers." Marconi's Wireless Telegraph Co., Ltd. May 27th, 1931. (386501.)

12152. "Single-phase induction motors." English Electric Co., Ltd., L. Roberts, and R. D. Ball. April 27th, 1932. (386503.)

12869. "Electrical gramophone pick-ups." General Electric Co., Ltd., and F. H. Brittain. May 4th, 1932. (386507.)

13398. "Single-phase induction motors." English Electric Co., Ltd., L. Roberts, and R. D. Ball. May 10th, 1932. (386512.)

14783. "Methods and devices for electrical integration." W. H. Joens & Co., Ges. May 26th, 1931. (386521.)

15555. "Driving-motors for centrifuges." International General Electric Co., Inc. June 1st, 1931. (386524.)

16417. "Control of a motor in Leonard connection." Akt.-Ges. Brown, Boveri, et Cie. June 12th, 1931. (386532.)

16458. "Electric lampholders." A. Savary. February 23rd, 1932. (Addition to 16430/32.) (386533.)

16689. "Lighting fittings." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 23rd, 1931. (386538.)

16787. "Electric connection device." A. J. Willmot. June 14th, 1932. (386540.)

18637. "Overload electric switches." W. Leyhausen. July 1st, 1932. (386555.)

19381. "Method of and means for purifying gases electrically." Lodge-Cottrell, Ltd. (Siemens-Schuckertwerke Akt.-Ges.). July 8th, 1932. (386560.)

19703. "Arrangement embodying a positive column luminous tube for television purposes." Fernseh Akt.-Ges. July 30th, 1931. (Addition to 11228/32.) (386563.)

19967. "Machines for stripping the insulation from electrical conductors." English Electric Co., Ltd., and A. A. Heath. July 14th, 1932. (386568.)

22126. "Electric switches." P. Hochkopper, E. Assmann, and O. Winkel (trading as P. Hochkopper & Co.). August 6th, 1932. (386584.)

22750. "Electric discharge tubes for the emission of luminous rays." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 19th, 1931. (386586.)

24314. "High-tension electric switches." British Thomson-Houston Co., Ltd. (Allgemeine Elektricitäts-Ges.). August 31st, 1932. (386595.)

34899. "Liquid-break electric circuit-breakers." British Thomson-Houston Co., Ltd. July 10th, 1930. (Divided application on 19949/31.) (386326.)

Telephones in Western Australia

THERE are 815 telephone exchanges in Western Australia and every town has some kind of telephone system, no matter how small or sparsely populated. In Perth there are 15,587 stations in the Metropolitan area and 10,004 exchange lines in the country; altogether Western Australia has approximately 27,000 telephones with 131,399 miles of wires. In the Perth Metropolitan area there are five exchanges, two of which are fully automatic (Perth and Cottesloe). Fremantle is semi-automatic, inward automatic and central battery outward. All the others are on the magneto system. Kalgoorlie, the centre of the goldmining industry, has a small automatic exchange. In Perth and some of the suburbs the automatic system is in use. Fremantle has one large common battery exchange and this serves the town of Fremantle and its environs.

The latest type of telephone apparatus is used in Western Australia; Perth employs the Strowger and Siemens (London) systems, whilst rural towns are supplied with equipment of the country's own specification evolved in Melbourne and regarded in the Commonwealth as the most suitable for local conditions, one of which is a lack of public power supply. All batteries are now being made locally and materials purchased through the Melbourne Administration, which distributes them where and as required. Wires and cables are also made in Australia, but the majority of the telephone instruments and machinery is imported.

The climate in Western Australia is much drier in the summer time and for four months there is no rain, with the result that dust troubles are serious. In Perth some of the cables are underground, but for the most part they are overhead throughout Western Australia, the poles used being of jarrah or gum wood, which resists the attacks of white ants. Overhead wires are gradually being abandoned in favour of underground cables. The latter suffer from white ants and fumigation with carbon dioxide has been employed. The cables are drawn into continuous ducts, the duct at one damaged section being sealed and pumping done at the other. At one section in Perth it is necessary to treat cables with gas twice a year. Experiments have also been made with an arsenic treacle mixture, but the results have not been yet ascertained.

Magnetic storms are encountered on lines running east and west and on very long lines. This is due to strong currents, which were always in evidence when the aurora display was more pronounced, and for days lines used to be almost inaudible, but now by using metallic circuits this trouble has been overcome. Transportation of poles and telephone materials is gradually veering more and more to motor transport, but there are still many horses and carts in use; in some parts of the country, especially in the North, camel teams and pack-horses are resorted to where there are no roads.

The peak in the development of telephones in Western Australia was reached in the year 1930, after which a depression in general trade and agriculture set in, which has been reflected in the use of telephones and trunk calls, every section of the community doing its utmost to economise. This, however, is undoubtedly a temporary halt in progress in harmony with the depression in all other countries.—WALTER BUCHLER.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alnwick.—Houses, Hauxley; J. T. Robson, R.D.C. surveyor.

Ashington (NORTHUMBERLAND).—Houses (20), for the Council of the Christian Churches; R. Gray, councillor.

Bedford.—School gymnasium for E.C. (£5,775); S. Foster and Son, builders, Kempston.

Billericay (ESSEX).—Houses (24); H. B. Mayhew, R.D.C. surveyor.

Billingham-on-Tees.—Houses (66); Kitching & Co., architects, 21, Albert Road, Middlesbrough.

Bilston.—Houses (200); W. G. Lofthouse, U.D.C. architect.

Cambridge.—Houses (36); C. H. Kemp, town clerk.

Cambridgeshire.—School, Fen Ditton, for the County E.C.; director of education, Cambridge.

Canterbury.—Houses (30), Sturry Road, for R. Overington. Re-erection of business premises, Best Lane, for H. Hart & Co.

Chelmsford.—Civic centre and public library block; R. A. Cordingley, architect.

Cheltenham.—Houses (50), Alstone Estate; borough engineer and Rainger & Rogers, architects. Houses (32), St. Mark's Estate (£10,560); Cutler & Sysum, Ledbury. Extensions, Christchurch School, Malvern Road, and St. Mark's School, Alstone Lane; managers.

Chester-le-Street (DURHAM).—Houses for Aged People (£11,900); W. Ridley, U.D.C. surveyor.

Chichester.—Sugar-beet factory for the Sussex Sugar Co., Ltd.; L. P. Smellie, director.

Cramlington (NORTHUMBERLAND).—Houses (40); U.D.C. surveyor.

Crayford (KENT).—Houses (£8,440); U.D.C. surveyor.

Dorking.—Houses for the Dorking Homes, Ltd.; M. R. Davies, secretary, Bank Chambers, 80a, High Street.

Droitwich.—Houses (38); R.D.C. surveyor.

Dudley.—Municipal buildings (£60,000); Harvey & Wicks, architects, Birmingham.

Egham (SURREY).—Houses (52), for J. C. Fox.

Erith.—Houses (44); U.D.C. surveyor.

Essex.—School, Dagenham Heathway (£7,293); V. G. Selwood and Co., builders, Chelmsford. School, Dagenham Heath (£34,178), and extensions, Royal Eastern Counties Institution, Colchester (£200,000); J. Stuart, county architect, Chelmsford.

Gateshead-on-Tyne.—Houses (78), Beverley Road, Shipcote; W. E. Hall & Sons, Ltd., builders, Low Fell. Houses (66), between Church Road and Kell's Lane; E. P. Calderwood, builder.

Gillingham.—Houses (29), Chalkenden Estate, London Road; F. B. Cooper.

Glasgow.—Houses (730), Scotstoun Estate; housing director and trade contractors. Cinema, Clarkston Road and Bogton Avenue; W. Beresford Inglis. Postal district sorting office, Victoria Road; H. M. Office of Works, 122, George Street, Edinburgh.

Godstone (SURREY).—Houses (24); S. Easter, R.D.C. surveyor, Station Road West, Oxted.

Great Horkesley (ESSEX).—Houses (100), with electrical work; Rural Housing Co.

Guildford.—Houses (156), with electric wiring; J. W. Hipwood, borough surveyor. School (£12,625), for the Borough E.C.; director of education.

Hampshire.—School, Hartley (£10,201), for the County E.C.; director of education, Winchester.

Heanor (NOTTS).—Houses (52), Codnor Estate; U.D.C. surveyor.

Hendon.—Extensions, Leavesden Hospital (£16,077); C. P. Roberts & Co., Ltd.

Hinckley.—Re-erection of factory for the Hinckley Hosiery Co. (£35,000).

Hull.—Cinema, Ferensway; R. G. Tarran, for City & Suburban Cinemas (Hull), Ltd.

Huntingdon.—Canning factory, for Chivers & Co., Ltd., Histon. Alterations, &c., Market Hill, for Boots, Ltd., Nottingham.

Ilford.—Houses (48), Brian Road; G. J. Gullimore. Houses (39), Emmott Avenue; C. Fryatt. Houses (23), Highwood Gardens; A. Smith. Houses (26), Holland Park Avenue; Bolland Bros.

Irish Free State.—(CARLOW).—Houses (63); W. P. Hade, architect, Dublin Street.

Kent.—School, Aylesford (£6,510); education architect, Maidstone.

Keswick.—Houses, Heads Lane; J. Peascod, U.D.C. architect.

Kingsbury.—Extensions, Roe Green School (£9,155); A. & B. Hanson, Ltd., Southall.

Lanarkshire.—Houses (162), Chryston, Wishaw, and Cambuslang, with electrical work; P. C. Smith, 13, Clydesdale Street, Hamilton.

Lancashire.—School, Failsworth; director of education, County Offices, Preston.

Leeds.—Re-erection of factory, Playfair Road, Hunslet, electrically equipped, for Japa Paper Products, Ltd. (£15,000).

Leicester.—Municipal aerodrome; borough surveyor.

Little Thurrock (ESSEX).—Church; Rev. J. C. Nunns.

Liverpool.—Flats (68), Camden Street, Birkenhead; H. J. Rowse, architect, 5, India Buildings, Water Street. Bank, Water Street and Fenwick Street, for the National Provincial Bank, Ltd. (electrical installations); G. E. Wallis & Sons, Ltd., builders, Broadmead Works, Maidstone, Kent.

London.—Extensions to Eastern (£19,860) and Western Hospitals (£25,225); L.C.C. architect. (CANNING TOWN).—Flats (72), Shipman Road (£35,000); Society for Improving Conditions of Working Classes, 26, Hart Street, W.C.1. (ISLINGTON).—Tenements (28), Wedmore Estate (£12,600); C. P. Roberts & Co., Ltd. (LAMBETH).—Flats (50), Archbishop's Park (£35,000); Society for Improving the Conditions of the Working Classes, 26, Hart Street, W.C.1. (STREATHAM).—Houses (100), Leigham Court Road; Wates, Ltd., 668, Streatham High Road. (TOTTENHAM).—Houses (29), White Hart Lane; L.C.C. Architect's Dept.

Macclesfield.—Extensions, Isolation Hospital, Moss Lane (£26,000), for the Hospital Committee (electrical installation); E. Hamson, borough surveyor, Town Hall.

Maidenhead.—Extensions, 69, High Street, for the National Provincial Bank, Ltd., London.

Maltby (YORKS).—Houses (300); U.D.C. surveyor.

Manchester.—Skating rink and dance hall, Burlington Street; A. Winstanley, architect, 15, Great Ducie Street. Junior school, Wythenshawe; city architect.

Morpeth (NORTHUMBERLAND).—Mental institution, Northgate site; county architect.

Newcastle-on-Tyne.—Cinema and block of offices and shops, Haymarket; Dixon & Bell, architects, Pearl Buildings.

New Forest.—Houses (28), Totton; R.D.C. surveyor.

Nottingham.—Greyhound racing track, Trent Lane, for the White City (Nottingham), Ltd. (electrical installations); H. A. Dickman, architect, 1, King's Walk.

Oldbury.—Houses (74), Mushroom Hall Estate, Langley; W. Greenwood, U.D.C. engineer and surveyor.

Oldham.—Houses (386); borough engineer.

Ramsgate.—Restaurant and amusement hall, Harbour Station site; Wood & Kendrick and E. F. Reynolds, architects, 57, Colmore Row, Birmingham.

Reading.—Cinema, King's Road (£20,000); F. G. Sainsbury, architect, 154, Friar Street.

Richmond (SURREY).—Houses (104), Richmond and Ham; borough surveyor.

Romford.—Houses (42), Rainham; W. E. Walsham, Ltd., builders, Grays.

Rotherfield (SUSSEX).—Electric lighting installation, Parish Church; incumbent.

Rowley Regis.—Houses (146), Gorsty Hill Estate; C. Buckley, Council House, Old Hill, Staffs.

Rugby.—Business stores, Chapel Street (£7,000), for the Co-operative Society; secretary.

Rutherglen (LANARKSHIRE). — Houses (138), Newfield (£41,000); burgh engineer.

Saltburn (YORKS).—Houses (30); U.D.C. surveyor.

Seaham Harbour.—Masonic hall (£3,400); W. G. Tomlin, builder, Love Lane.

Sheffield.—Cinema, dance hall, and billiard hall, Beck Road; Shiregreen Cinema Syndicate, Ltd. School, Hartley Brook Road; director of education, Education Offices. School, Woolley Wood (£14,000); H. Knowles & Son.

Shipley.—Houses (64), Wrose Road; A. & F. Mellor. Houses (50), Claremont Road; Claremont Land Development Co., Ltd. Houses (73), Victoria Park Estate; H. Chippindale. Houses (20), Westfield Lane; A. Dickinson.

Sittingbourne and Milton Regis.—Houses (120); M. W. Lashmar, U.D.C. surveyor.

Smethwick.—Houses (468), Warley Estate (£138,500); borough engineer. Extensions to hospital, Holly Lane (£7,000); E. Fletcher, surveyor, Town Hall. School extensions and improvements (£13,000) for E.C.

Southampton.—Re-erection of joinery works, saw mills, &c., for Camper & Nicholson, Northam.

Southend.—Central bus station; borough surveyor.

Southsea.—Houses (77) with electrical work; Councillor J. Privett.

Southgate.—Houses (37), Broadfields Avenue; O. R. Davis. Houses (63), Greenway; C. E. Hartshorne. Cinema and shops (13), Bowes Road; W. J. King. Seven shops, Green Lanes; J. S. Beard & Clare.

Southport.—New Lido, Ainsdale, including café, two dressing pavilions, &c. (£30,500); G. & J. Seddon, Ltd., builders, 5, Manchester Road, Little Hulton, near Bolton.

South Shields.—House, West Park Estate; W. D. Allison, builder, Whitburn. Houses (142) and clinic; J. Paton Watson, borough surveyor, Town Hall.

Sprotborough (YORKS).—Houses (51), The Park, for G. W. Meanley, Melton.

Stafford.—Reconstruction of the Guildhall (£18,000); borough surveyor, Eastgate Street.

Stockport.—Senior school, Lisburne Lane, for the Borough E.C.; director of education.

Sunderland.—Houses, Alexandra Road Estate (58) and Grange Estate (150); Millburn & Co., architects, 17, Fawcett Street. Houses, Commercial Road (84), West Moor (24), and Marley Potts (154); T. P. Collinge, borough surveyor. Houses (22), Carley Hill (£6,222); T. D. Gibbons, builder, 44, Corporation Road. Houses (74), Whitburn; J. W. White, builder. High Barnes, and J. & T. Parker, St. Oswald's House. Shops and garages, Ashwood Street; R. Stewart, builder, 6, Thornberry Street. R.C. school; A. Harrison, architect, 69, High Street, Stockton.

Surbiton.—School (200 places) for the R.C. Managers; E. J. Redding, 114, Maple Road.

Surrey.—School, West Ewell (£11,860); education architect, Kingston-on-Thames.

Sutton Coldfield.—Houses (74), Boldmere Road; Morris Jacombs & Co. Houses (168), Holland House Estate; borough engineer. Eight shops, Birmingham Road; F. W. Wheeldon.

Tunbridge Wells.—Printing works, with electrical equipment, for the *Kent & Sussex Courier*; T. Bates & Sons, Ltd., builders.

Tynemouth.—Houses (24), North Shields, for Square Building Trust; H. D. Burton, builder, King Street, North Shields.

Whitley Bay (NORTHUMBERLAND).—Houses (300), Briar Dene Estate; J. C. Brewis, builder.

Whitwood (YORKS).—Houses (20); Wynne & Smith, builders, Hightown, Castleford.

Wimbledon.—Theatre (250 seats); borough surveyor.

Wymondham (NORFOLK).—Estate development; Downham Grove Estate Co.